

WRLFMD Quarterly Report January to March 2019

Foot-and-Mouth Disease





CONTENTS

1.	Summary of samples tested and reported FMD outbreaks	3
1.1.	Global Overview of samples received and tested	3
1.2.	Asia	3
1.3.	Africa	5
1.4.	South America.....	8
1.5.	Uncharacterised FMD viruses	9
2.	Detailed Analysis.....	12
2.1.	Asia	12
2.2.	Africa	26
2.3.	Vaccine matching.....	40
Annex 1:	Sample data	41
2.4.	Summary of Submissions	41
2.5.	Clinical Samples.....	42
2.6.	Antigenic Characterisation	50
Annex 2:	FMD publications	52
Annex 4:	Brief round-up of other WRLFMD activities	57

The content of this report is the property of WRLFMD®, The Pirbright Institute.

Copies of all the individual reports cited herein can be obtained from The Pirbright Institute and prior to presentation, publication or any other public use of these data, please contact Dr Donald King, The Pirbright Institute, donald.king@pirbright.ac.uk



1. Summary of samples tested and reported FMD outbreaks

1.1. Global Overview of samples received and tested

The location of all samples detailed in this report can be seen on the map below. More detailed maps and sample data, on a country by country basis, can be found in the following sections of this report.

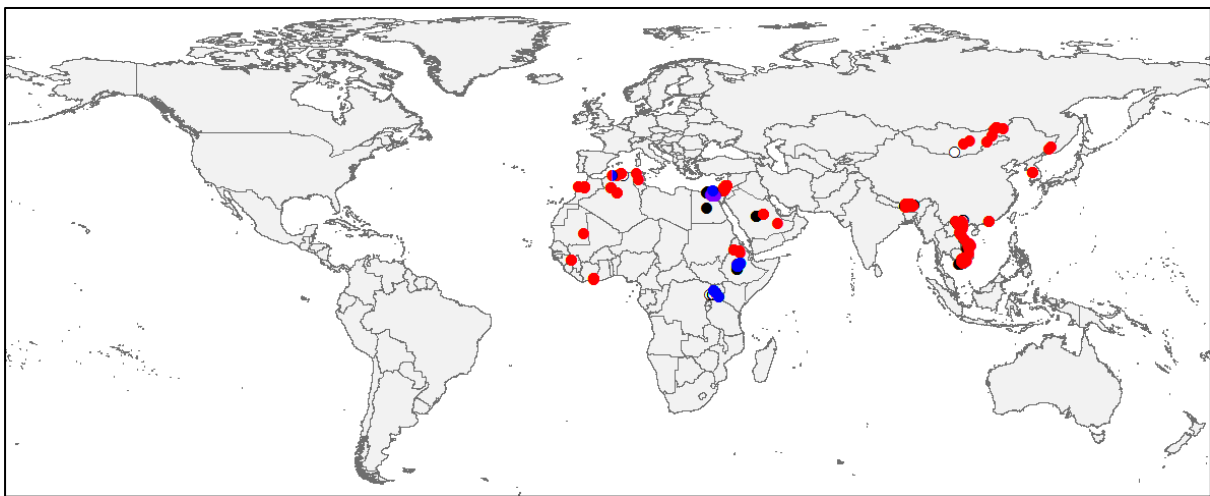


Figure 1: Samples tested by WRLFMD in this quarter (coloured spots define serotypes detected (red – serotype O and blue serotype A))

1.2. Asia

Bhutan

A batch of 34 samples, collected from cattle and goats between May 2018 and January 2019, was received on 15th March 2019. **FMD type O** was identified in 21 samples, 10 were FMDV Genome Detected (FMDV-GD) and 3 were No Virus Detected (NVD). Genotyping showed all the type O viruses to be ME-SA/Ind-2001e (see below).

China, People's Republic of

Two further outbreak of **FMD type O** were reported in cattle in the Inner Mongolia and Xinjiang Regions on 13th February 2019 and 17th March 2019, respectively. No genotyping information has been reported.

The content of this report is the property of WRLFMD®, The Pirbright Institute.

Copies of all the individual reports cited herein can be obtained from The Pirbright Institute and prior to presentation, publication or any other public use of these data, please contact Dr Donald King, The Pirbright Institute, donald.king@pirbright.ac.uk



Hong Kong SAR

A batch of six samples, collected from pigs between September and December 2018 was received on the 16th January 2019. Four were identified as **FMD type O** and two were No Virus Detected (NVD). Genotyping showed the type O's to be CATHAY topotype.

Israel

Between 16th November 2018 and 26th December 2018, 7 further outbreaks of **FMD type O** were reported in cattle in the Northern District (Hazafon). A batch of 84 samples, collected between April and December 2018, were received to WRLFMD on 15th January 2019. 70 were identified as **FMD type O**, five as FMDV Genome Detected (FMDV-GD) and nine as No Virus Detected (NVD). Genotyping showed all the type O's to be ME-SA/PanAsia-2QOM-15 (see below).

Laos

Four **FMD type A** VP1 sequences, from a samples collected in 2018, were received from the OIE Regional Reference Laboratory (RRL) in Pakchong (Thailand) on 18th January 2019. Genotyping showed it to belong to the ASIA topotype, Sea-97 lineage (see below).

Mongolia

A batch of seven samples, collected from cattle, pigs and gazelle, was received on 21st January 2019. All were identified as **FMD type O**, except the one from a gazelle which was No Virus Detected (NVD). Genotyping revealed one ME-SA/PanAsia, four ME-SA/Ind-2001e and one SEA/Mya-98 (see below).

Palestinian Autonomous Territories

A single sample, collected from sheep in July 2018, was received on 15th January 2019. **FMD type O** was isolated. Genotyping showed it to belong to the EA-3 topotype (see below).

Republic of Korea (South Korea)

Between 26th and 31st January 2019, three outbreaks of **FMD type O** were reported in cattle in Gyeonggi-Do and Chungcheongbuk-Do. On the 29th and 30th January 2019, two **FMD type O** VP1 sequences were received from the APQA, Republic of Korea; genotyping showed them to belong to the ME-SA/Ind-2001e lineage. On the 1st

The content of this report is the property of WRLFMD®, The Pirbright Institute.



February 2019, five samples, collected from cattle at Geumgwang-myeon, Anseong-si, Gyeonggi-Do on the 28th January 2019, were received. They were all identified as **FMD type O** and were genotyped as ME-SA/Ind-2001e (see below).

Russian Federation

Between 1st January 2019 and 12th February 2019, 16 outbreaks of **FMD type O** were reported in pigs in the Primorskiy kray and Khabarovskiy kray regions. Subsequently, on 8th March 2019, an outbreak of **FMD type O** was reported in cattle, sheep and goats in the Zabajkal`Skij Kray region. Six **FMD type O** VP1 sequences were received from ARRIAH on 27th February 2019; genotyping showed three (cattle, Zabajkal`Skij kray, February 2018) to belong to the ME-SA topotype, PanAsia lineage and three (pigs, Primorskiy kray, January 2019) belonged to the SEA topotype, Mya-98 lineage (see below). A further **FMD type O** VP1 sequence (cattle, Zabajkal`Skij kray, March 2019) was received from ARRIAH on 18th March 2019; genotyping showed it to belong to the ME-SA/Ind-2001e lineage (see below).

Saudi Arabia

A batch of 11 samples, collected from cattle, sheep, oryx and gazelle between January and December 2018, were received on 28th February 2019. Typing/virus isolation results were as follows: 6 **FMD type O**, 2 FMDV Genome Detected (FMDV-GD) and 3 No Virus Detected (NVD). Genotyping identified the **FMD type O** viruses as ME-SA/Ind-2001e (see below).

Vietnam

A batch of 55 samples, collected from cattle, pigs and water buffalo between 23rd January 2018 and 15th January 2019, was received on 5th February 2019. The typing/virus isolation results were as follows: 47 **FMD type O**, 5 FMDV Genome Detected (FMDV-GD) and 3 No Virus Detected (NVD). Genotyping showed the type O's to belong to the following: 3 CATHAY, 16 ME-SA/PanAsia and 28 SEA/Mya-98 (see below).

1.3. Africa

Algeria

Between 12th November 2018 and 31st December 2018, a further 59 outbreaks of **FMD type O** were reported in cattle, sheep and goats across northern Algeria. A batch of eight samples, collected from cattle and sheep between December 2018 and January 2019, was received on the 21st January 2019. **FMD type O** was identified in five

The content of this report is the property of WRLFMD®, The Pirbright Institute.



samples, FMDV Genome Detected (FMDV-GD) in one and No Virus Detected (NVD) in two. ELISA typing of one sample, ALG/8/2018, indicated both type O and type A to be present, but we were unable to detect type A by VP1 RT-PCR/sequencing. Genotyping showed all the type O viruses to belong to toptotype EA-3 (see below). Nine **FMD type O** VP1 sequences were received from ANSES, France on 15th January 2019; genotyping showed them to belong to the EA-3 toptotype (see below). On 27th March 2019, ANSES submitted three **FMD type O** samples to the WRLFMD for vaccine matching; genotyping confirmed them to belong to the EA-3 toptotype.

Côte d'Ivoire

Three **FMD type O** VP1 sequences were received from ANSES on 16th January 2019; genotyping showed them to belong to the EA-3 toptotype (see below). On 27th March 2019, ANSES submitted three **FMD type O** samples to the WRLFMD for vaccine matching; genotyping confirmed them to belong to the EA-3 toptotype.

Egypt

A batch of 37 samples, collected between January 2017 and November 2018, was received on 16th January 2019. Typing/virus isolation results were as follows: 2 **FMD type O**, 1 **FMD type A**, 6 **FMD type SAT 2**, 19 FMDV Genome Detected (FMDV-GD) and 9 No Virus Detected (NVD). Genotyping showed the type O's to be toptotype EA-3, the A to be AFRICA/G-IV and the SAT 2's to be toptotype VII (1 lineage Ghb-12 and 5 lineage Lib-12) (see below). Eleven of the FMDV Genome Detected (FMDV-GD) samples, which had reasonable real-time RT-PCR Ct values, were subjected to a pan-specific VP1 RT-PCR, but all were negative.

Ethiopia

A batch of 55 samples collected from cattle between August and December 2018 were received on the 11th January 2019. Typing/virus isolation results were as follows: 10 **FMD type O**, 26 **FMD type A**, 5 FMDV Genome Detected (FMDV-GD) and 15 NO VIRUS DETECTED (NVD). Genotyping showed the type O's to be toptotype EA-3 and the type A's to be AFRICA/G-IV (see below).

Guinea

On 27th March 2019, ANSES, France submitted three **FMD type O** samples to the WRLFMD for vaccine matching; genotyping confirmed them to belong to the EA-3 toptotype.

The content of this report is the property of WRLFMD®, The Pirbright Institute.

Copies of all the individual reports cited herein can be obtained from The Pirbright Institute and prior to presentation, publication or any other public use of these data, please contact Dr Donald King, The Pirbright Institute, donald.king@pirbright.ac.uk



Malawi

On 21st February 2019, an outbreaks of **suspected FMD** was reported in Zioni, Mzimba (Northern Region). No typing results have been reported.

Mauritania

On 27th March 2019, ANSES, France submitted one **FMD type O** sample to the WRLFMD for vaccine matching; genotyping confirmed it to belong to the EA-3 toptype.

Morocco

Between 1st January 2019 and 18th March 2019, 34 outbreaks of **FMD type O** were reported over a wide area in cattle. Six **FMD type O** VP1 sequences were received from ANSES, France on 13th February 2019; genotyping showed them to belong to the EA-3 toptype (see below). On 27th March 2019, ANSES submitted four **FMD type O** samples to the WRLFMD for vaccine matching; genotyping confirmed them to belong to the EA-3 toptype.

Mozambique

An outbreak of **suspected FMD** was reported to have occurred on 17th May 2018 in cattle in Nampula in the north-eastern part of the country. Typing results are awaited.

South Africa

Between 2nd January 2019 and 31st January 2019, five further outbreaks due to **FMD type SAT 2** were reported in cattle in the Limpopo province. These cases in the surveillance zone have led to the suspension of the OIE-free status. No genotyping results have been reported.

Tunisia

Between 27th December 2018 and 10th February 2019, 10 further outbreaks of **FMD type O** were reported in cattle and sheep. Six **FMD type O** VP1 sequences were received from ANSES, France on 28th February 2019; genotyping showed them to belong to the EA-3 toptype (see below). On 27th March 2019, ANSES submitted two **FMD type O** samples to the WRLFMD for vaccine matching; genotyping confirmed them to belong to the EA-3 toptype.

The content of this report is the property of WRLFMD®, The Pirbright Institute.

Copies of all the individual reports cited herein can be obtained from The Pirbright Institute and prior to presentation, publication or any other public use of these data, please contact Dr Donald King, The Pirbright Institute, donald.king@pirbright.ac.uk



Uganda

A single outbreak of **FMD type A** was reported to have occurred on 25th January 2019 in cattle at Kaikuku, Kyensande, Kinoni, Nakaseke. On 12th February 2019, a batch of 52 samples were received. They were all collected from cattle in various locations between 31st January and 7th February 2019. The typing/virus isolation results were as follows: 8 **FMD type O**, 4 **FMD type A**, 3 FMDV Genome Detected (FMDV-GD) and 37 No Virus Detected (NVD). Genotyping showed the type O's to belong to the EA-2 toptotype and the type A's to belong to AFRICA/G-I (see below).

Zambia

Two outbreaks of **FMD type A** were reported to have occurred on the 17th September 2018 and 2nd October 2018 in cattle in the Northern Province. Additionally, two outbreaks of **FMD type O** were reported from cattle in the Central (Chisamba) and Southern (Monze) provinces on 17th January 2019 and 11th February 2019, respectively. Three samples were received by the WRLFMD at the end of the last quarter. They were collected from cattle on 24th October 2018 (location unknown). **FMD type A** viruses were isolated from all three samples and they were genotyped as A/AFRICA-G-I (see below).

Zimbabwe

On 15th January 2019 and 19th January 2019, two outbreaks of **FMD SAT 1** were reported in cattle in Masvingo (Mwenezi) and Matabeleland (Insiza) South Provinces, respectively. Eight outbreaks of **FMD type SAT 2** were reported between the 10th and 12th March 2019 in cattle in Mashonaland East (Beatrice, Seke).

No genotyping results have been reported.

1.4. South America

No new outbreaks of FMD were reported in the region.

STOP PRESS

On 17th April 2019, FMD was reported for the first time in Comoros (Indian Ocean). Sequence data for representative cases on the Island of Mwali (provided by ANSES, France) characterises these FMD virus as belonging to the O/EA-2 toptotype most closely related to FMD viruses found recently in Tanzania (sequence data kindly provided by Prof. Christopher Kasanga, Sokoine University of Agriculture, Tanzania).

The content of this report is the property of WRLFMD®, The Pirbright Institute.

Copies of all the individual reports cited herein can be obtained from The Pirbright Institute and prior to presentation, publication or any other public use of these data, please contact Dr Donald King, The Pirbright Institute, donald.king@pirbright.ac.uk



1.5. Uncharacterised FMD viruses

A number of outbreaks have occurred where samples have not been sent to the WRLFMD. It is probable that the countries involved have performed their own genetic characterisation; however, through the OIE/FAO Laboratory Network we would also like to encourage the submission of samples (or complete VP1 sequences) to the WRLFMD.

An up-to-date list and reports of FMD viruses characterised by sequencing can be found at the following website: <http://www.wrlfmd.org/country-reports/country-reports-2019>.

Results from samples or sequences received at WRLFMD (status of samples being tested) are shown in Table 1 and a complete list of clinical sample diagnostics made by the WRLFMD from January to March 2019 is shown in Annex 1 (Summary of Submissions). A record of all samples received by WRLFMD is shown in Annex 1 (

The content of this report is the property of WRLFMD®, The Pirbright Institute.

Copies of all the individual reports cited herein can be obtained from The Pirbright Institute and prior to presentation, publication or any other public use of these data, please contact Dr Donald King, The Pirbright Institute, donald.king@pirbright.ac.uk



Clinical Samples).

The content of this report is the property of WRLFMD®, The Pirbright Institute.

Copies of all the individual reports cited herein can be obtained from The Pirbright Institute and prior to presentation, publication or any other public use of these data, please contact Dr Donald King, The Pirbright Institute, donald.king@pirbright.ac.uk



Table 1: Status of sequencing of samples or sequences received by the WRLFMD from January to March 2019 (* indicates a batch carried over from the previous quarter).

WRLFMD Batch No.	Date received	Country	Serotype	No. of samples	No. of sequences	Sequencing status
WRLFMD/2018/00032*	14/12/2018	Zambia	A	3	3	completed
WRLFMD/2019/00001	11/01/2019	Ethiopia	O	10	10	completed
			A	26	26	completed
WRLFMD/2019/00002	16/01/2019	Hong Kong SAR	O	4	4	completed
WRLFMD/2019/00003	21/01/2019	Mongolia	O	6	6	completed
WRLFMD/2019/00004	15/01/2019	Israel	O	70	70	completed
WRLFMD/2019/00005	16/01/2019	Egypt	O	2	2	completed
			A	1	1	completed
			SAT2	6	6	completed
WRLFMD/2019/00006	15/01/2019	Palestinian AT	O	1	1	completed
WRLFMD/2019/00007	21/01/2019	Algeria	O	5	5	completed
WRLFMD/2019/00008	01/02/2019	South Korea	O	5	5	completed
WRLFMD/2019/00009	12/02/2019	Uganda	O	8	8	completed
			A	4	4	completed
WRLFMD/2019/00010	05/02/2019	Vietnam	O	47	47	completed
WRLFMD/2019/00011	28/02/2019	Saudi Arabia	O	6	6	completed
WRLFMD/2019/00013	15/03/2019	Bhutan	O	21	21	pending
WRLFMD/2019/00014	27/03/2019	Algeria	O	3	3	pending
WRLFMD/2019/00015	27/03/2019	Côte d'Ivoire	O	3	3	pending
WRLFMD/2019/00016	27/03/2019	Guinea	O	3	3	pending
WRLFMD/2019/00017	27/03/2019	Mauritania	O	1	1	pending
WRLFMD/2019/00018	27/03/2019	Morocco	O	4	4	pending
WRLFMD/2019/00019	27/03/2019	Tunisia	O	2	2	pending
Total				241	241	

The content of this report is the property of WRLFMD®, The Pirbright Institute.

Copies of all the individual reports cited herein can be obtained from The Pirbright Institute and prior to presentation, publication or any other public use of these data, please contact Dr Donald King, The Pirbright Institute, donald.king@pirbright.ac.uk



Table 2: VP1 sequences submitted by other FMD Network laboratories to the WRLFMD from January to March 2019.

WRLFMD Batch No.	Date received	Country	Serotype	No. of sequences	Submitting laboratory
WRLMEG/2019/00006	15/01/2019	Algeria	O	9	ANSES
WRLMEG/2019/00007	16/01/2019	Côte d'Ivoire	O	3	ANSES
WRLMEG/2019/00008	18/01/2019	Laos	A	4	TRRL
WRLMEG/2019/00011	29/01/2019	South Korea	O	1	APQA
WRLMEG/2019/00012	30/01/2019	South Korea	O	1	APQA
WRLMEG/2019/00018	13/02/2019	Morocco	O	6	ANSES
WRLMEG/2019/00019	27/02/2019	Russian Federation	O	6	ARRIAH
WRLMEG/2019/00020	28/02/2019	Tunisia	O	6	ANSES
WRLMEG/2019/00022	18/03/2019	Russian Federation	O	1	ARRIAH
Total				37	

The content of this report is the property of WRLFMD®, The Pirbright Institute.

Copies of all the individual reports cited herein can be obtained from The Pirbright Institute and prior to presentation, publication or any other public use of these data, please contact Dr Donald King, The Pirbright Institute, donald.king@pirbright.ac.uk

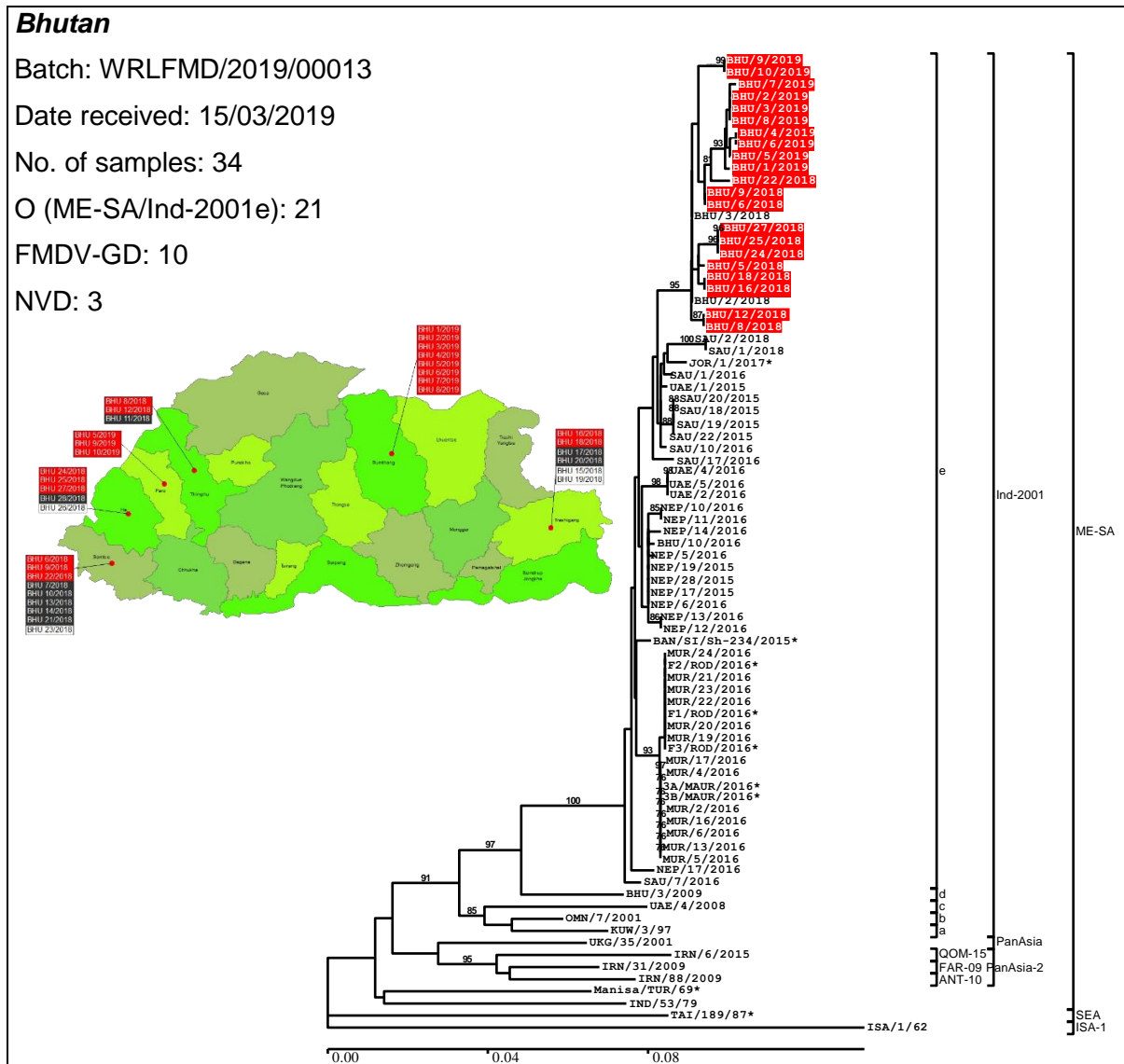


2. Detailed Analysis

Key for maps and trees:

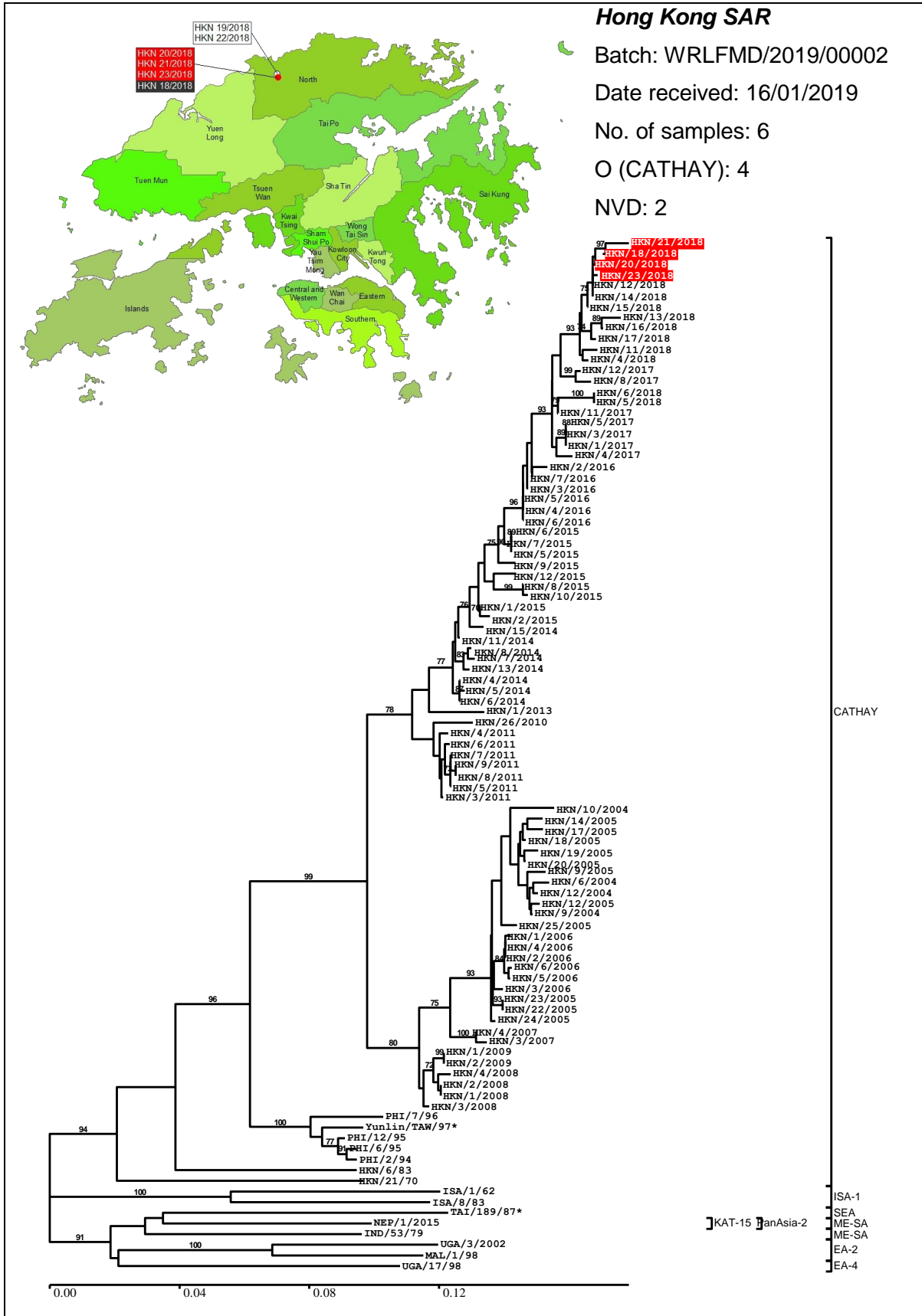
Serotype O	Serotype Asia-1	Serotype SAT 3
Serotype A	Serotype SAT 1	FMDV Genome Detected
Serotype C	Serotype SAT 2	No Virus Detected

2.1. Asia



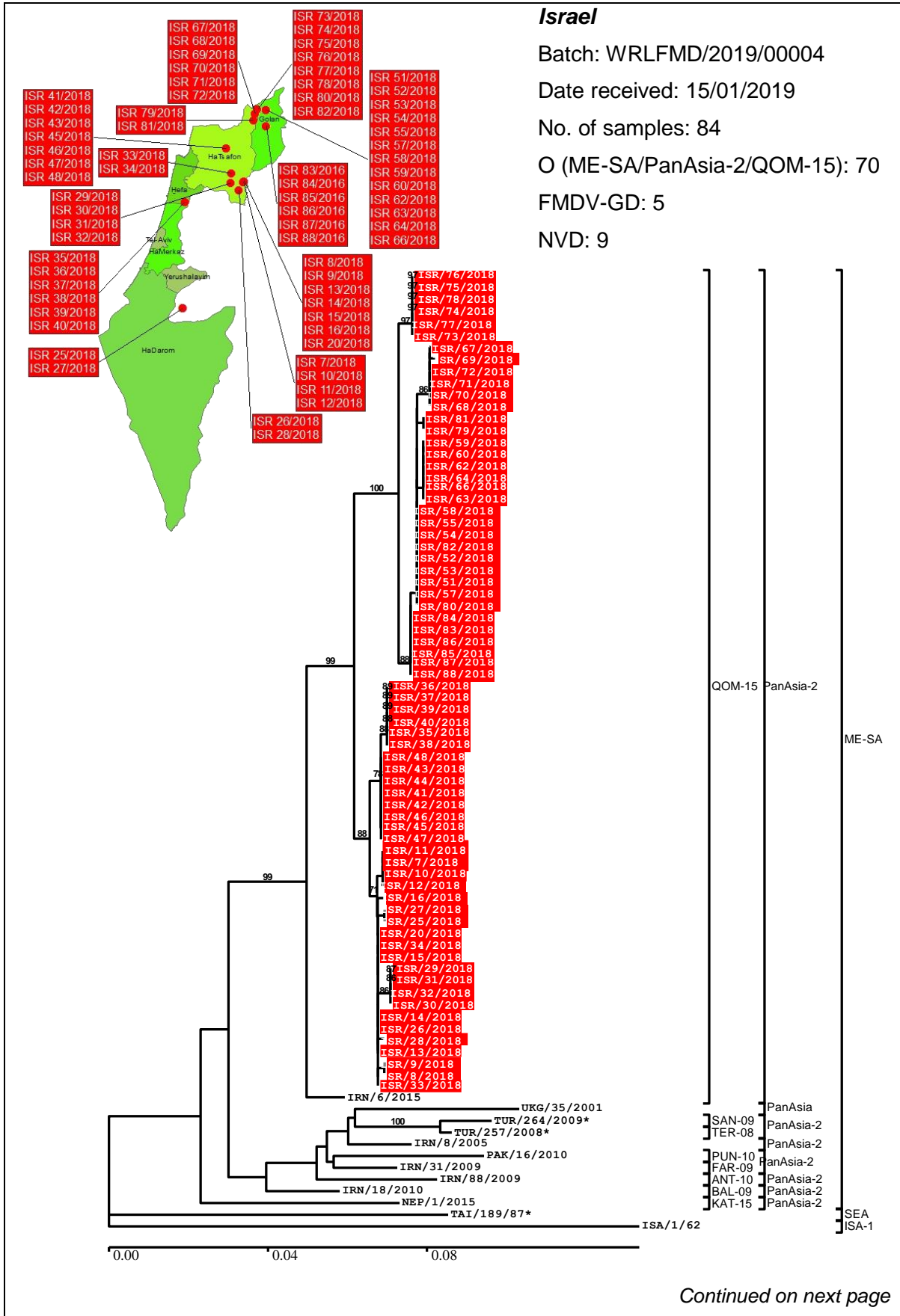
The content of this report is the property of WRLFMD®, The Pirbright Institute.

Copies of all the individual reports cited herein can be obtained from The Pirbright Institute and prior to presentation, publication or any other public use of these data, please contact Dr Donald King, The Pirbright Institute, donald.king@pirbright.ac.uk



The content of this report is the property of WRLFMD®, The Pirbright Institute.

Copies of all the individual reports cited herein can be obtained from The Pirbright Institute and prior to presentation, publication or any other public use of these data, please contact Dr Donald King, The Pirbright Institute, donald.king@pirbright.ac.uk

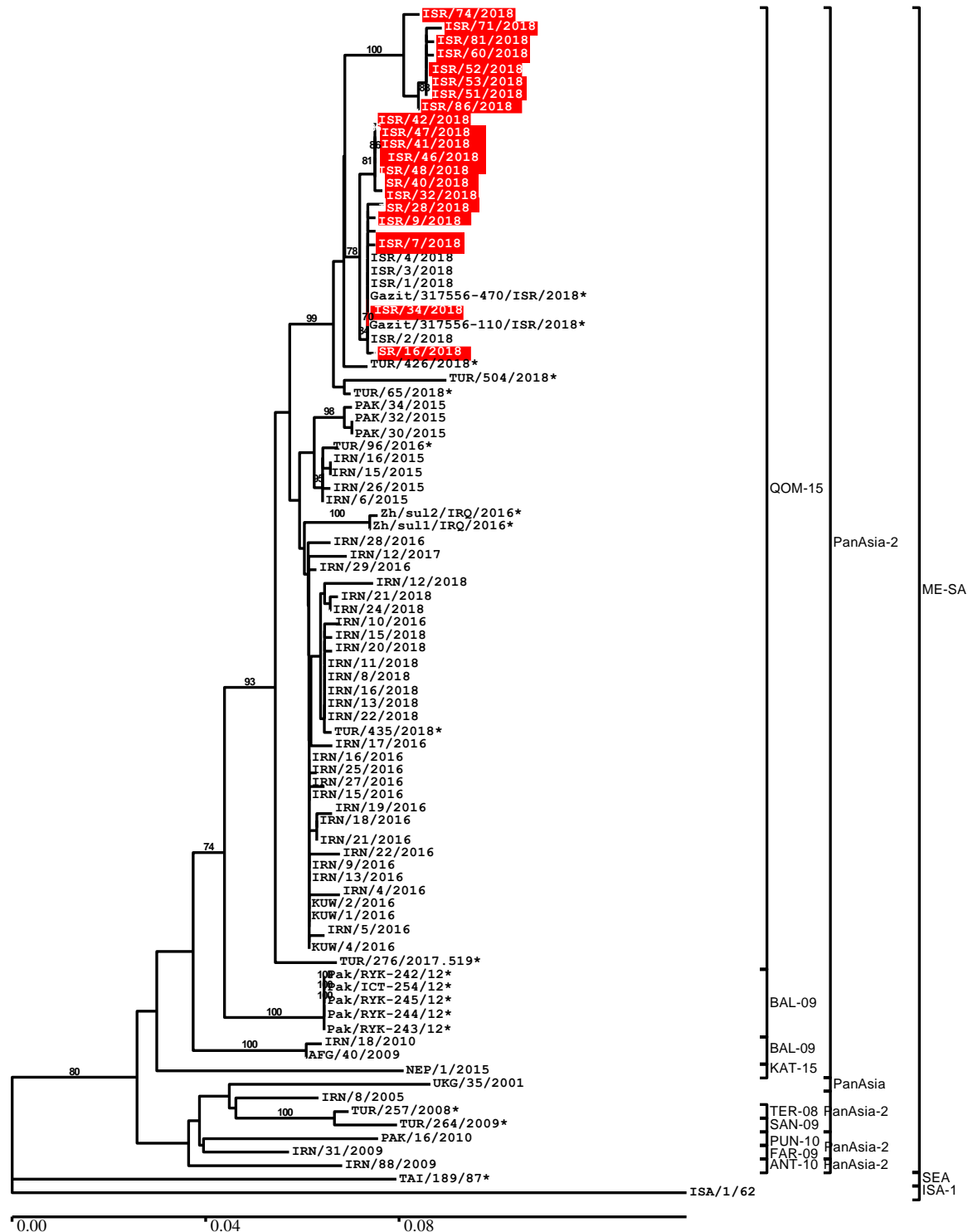


The content of this report is the property of WRLFMD®, The Pirbright Institute.

Copies of all the individual reports cited herein can be obtained from The Pirbright Institute and prior to presentation, publication or any other public use of these data, please contact Dr Donald King, The Pirbright Institute, donald.king@pirbright.ac.uk



Israel continued



The content of this report is the property of WRLFMD®, The Pirbright Institute.

Copies of all the individual reports cited herein can be obtained from The Pirbright Institute and prior to presentation, publication or any other public use of these data, please contact Dr Donald King, The Pirbright Institute, donald.king@pirbright.ac.uk



Laos

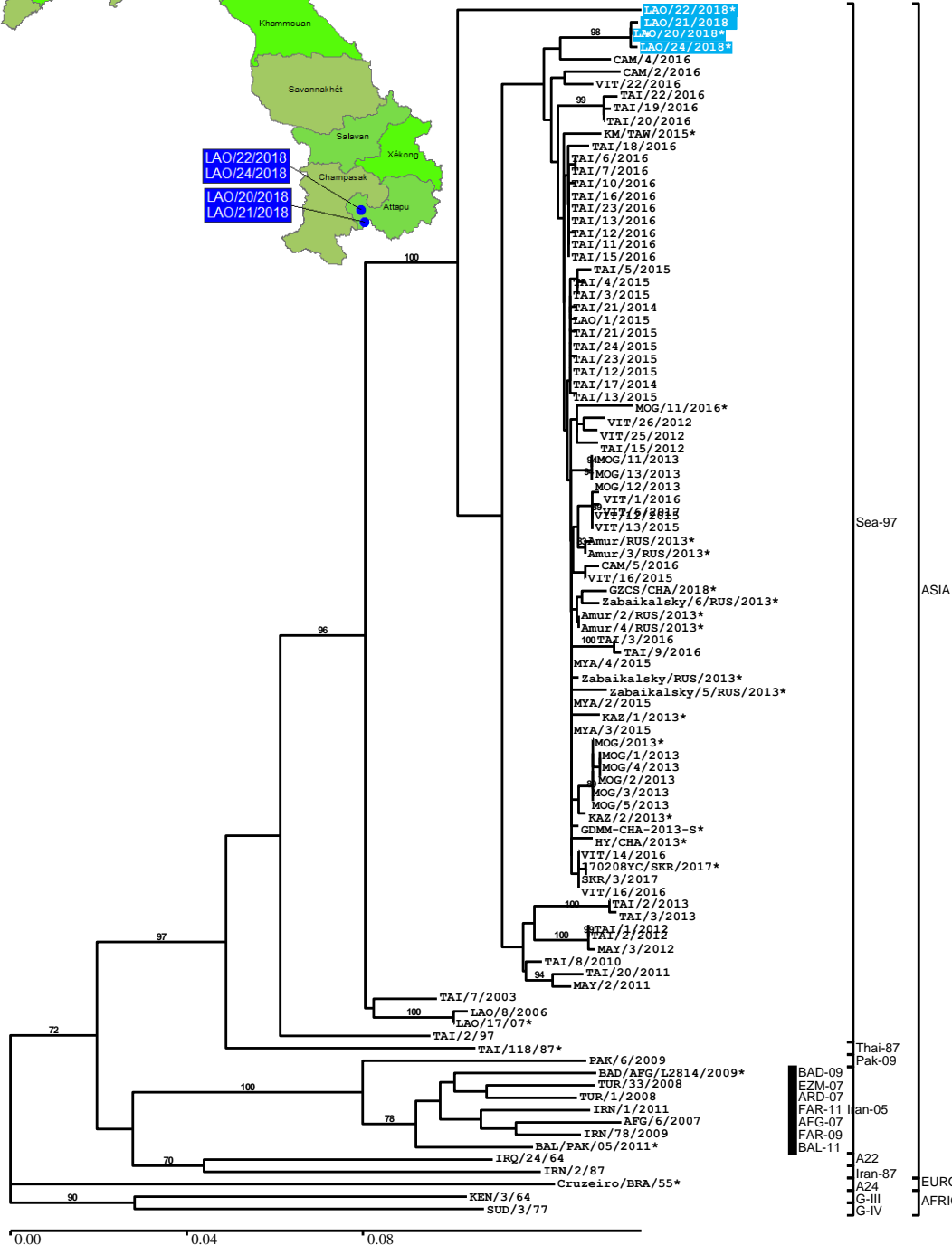
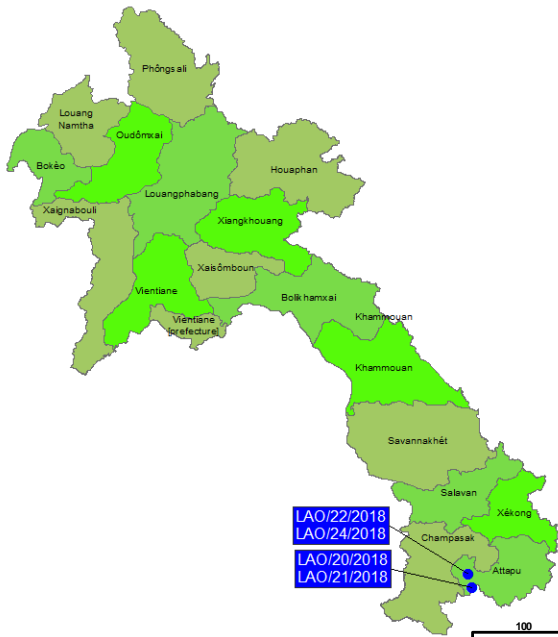
Batch: WRLMEG/2019/00008

Submitted by: TRRL

Date received: 18/01/2019

No. of sequences: 4

A (ASIA/Sea-97): 4



The content of this report is the property of WRLFMD®, The Pirbright Institute.

Copies of all the individual reports cited herein can be obtained from The Pirbright Institute and prior to presentation, publication or any other public use of these data, please contact Dr Donald King, The Pirbright Institute, donald.king@pirbright.ac.uk



Mongolia

Batch: WRLFMD/2019/00003

Date received: 21/01/2019

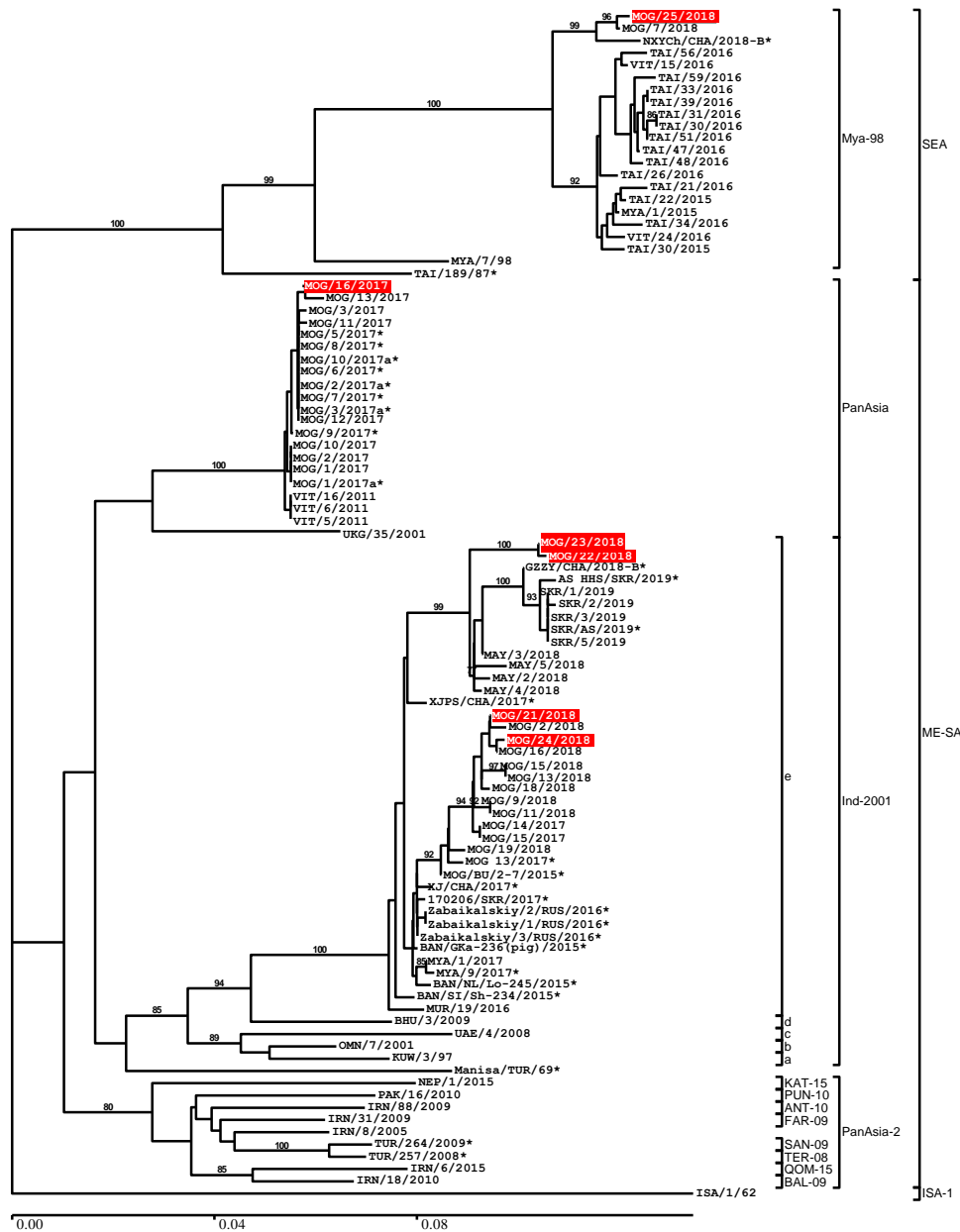
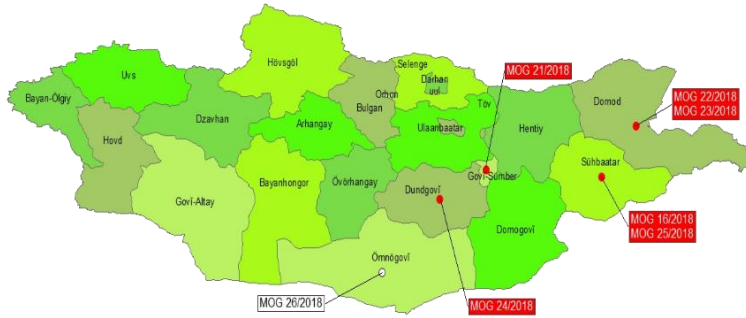
No. of samples: 7

O (ME-SA/PanAsia): 1

O (ME-SA/Ind-2001e): 4

O (SEA/Mya-98): 1

NVD: 1



The content of this report is the property of WRLFMD®, The Pirbright Institute.

Copies of all the individual reports cited herein can be obtained from The Pirbright Institute and prior to presentation, publication or any other public use of these data, please contact Dr Donald King, The Pirbright Institute, donald.king@pirbright.ac.uk



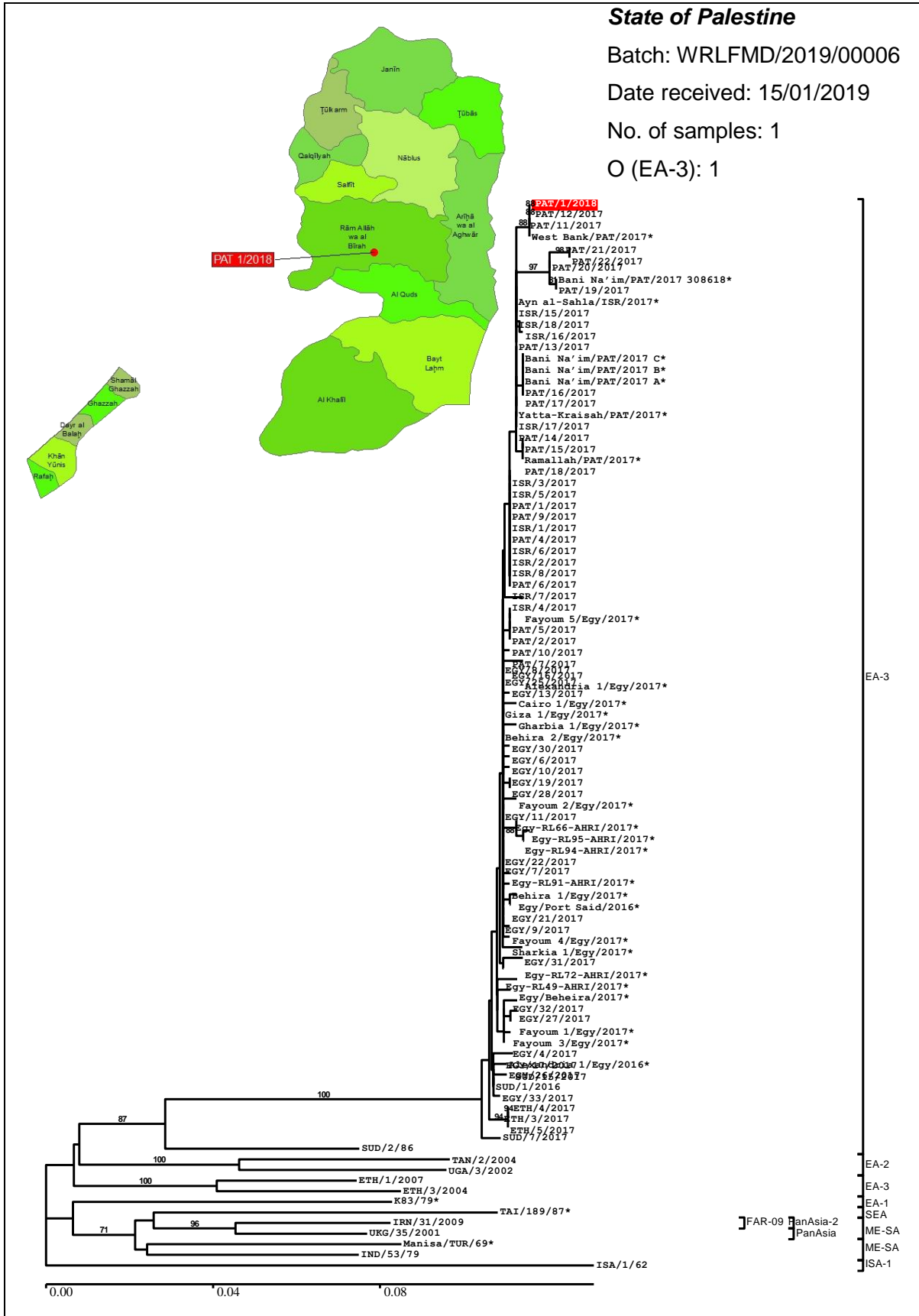
State of Palestine

Batch: WRLFMD/2019/00006

Date received: 15/01/2019

No. of samples: 1

O (EA-3): 1



The content of this report is the property of WRLFMD®, The Pirbright Institute.

Copies of all the individual reports cited herein can be obtained from The Pirbright Institute and prior to presentation, publication or any other public use of these data, please contact Dr Donald King, The Pirbright Institute, donald.king@pirbright.ac.uk



Republic of Korea (South Korea)

Batch: WRLFMD/2019/00008

Date received: 01/02/2019

No. of samples: 5

O (ME-SA/Ind-2001e): 5

Batch: WRLMEG/2019/00011

Submitted by: APQA

Date received: 29/01/2019

No. of sequences: 1

O (ME-SA/Ind-2001e): 1

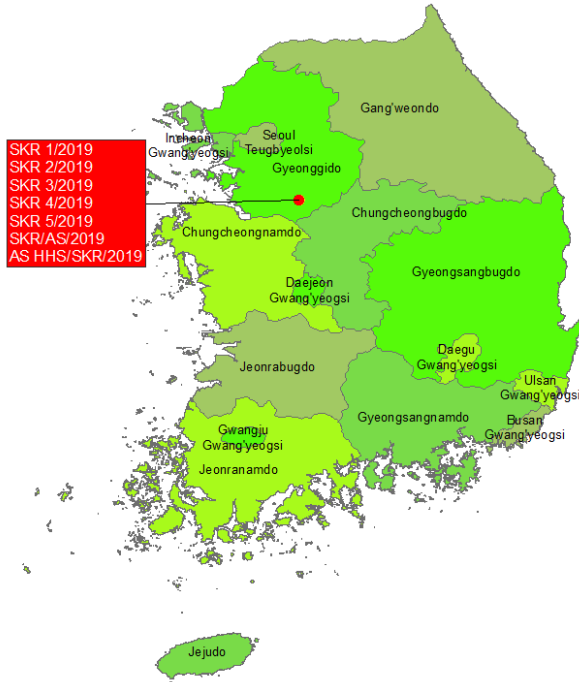
Batch: WRLMEG/2019/00012

Submitted by: APQA

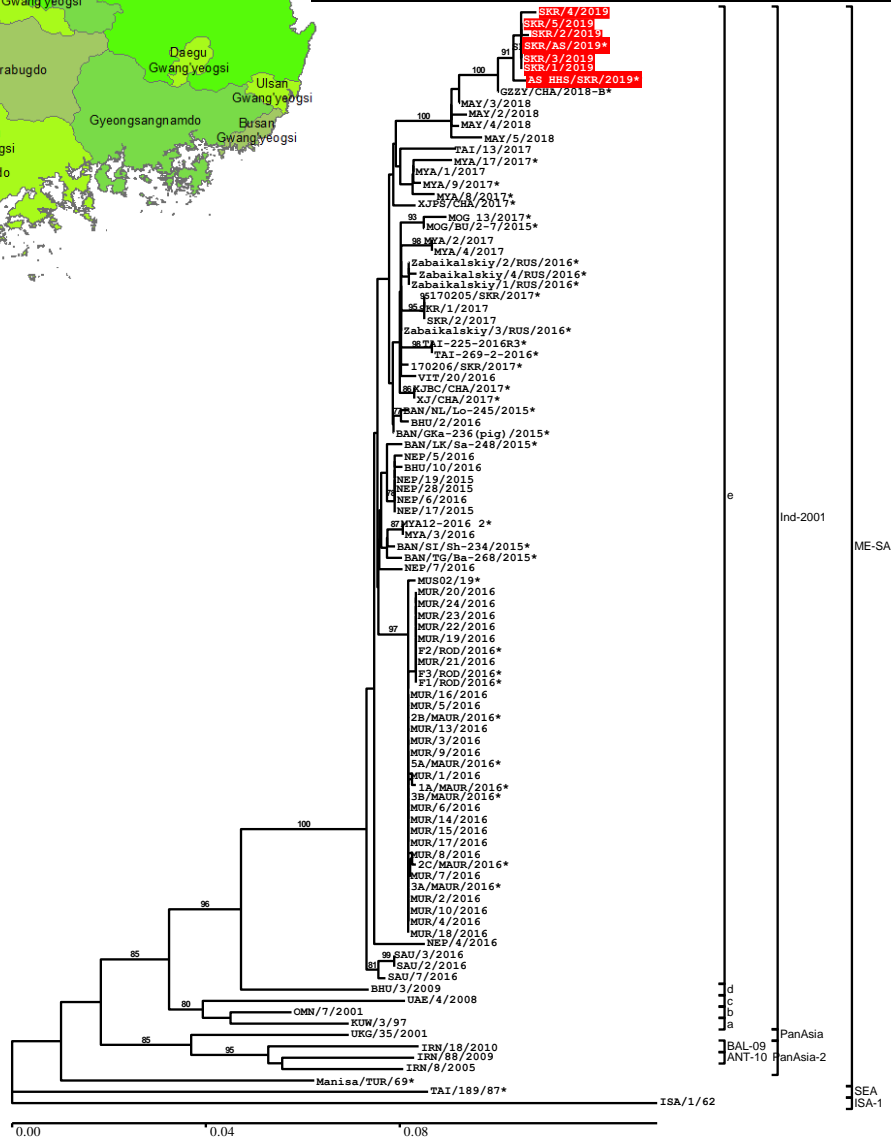
Date received: 30/01/2019

No. of sequences: 1

O (ME-SA/Ind-2001e): 1



SKR 1/2019
SKR 2/2019
SKR 3/2019
SKR 4/2019
SKR 5/2019
SKR/AS/2019
AS HHS/SKR/2019



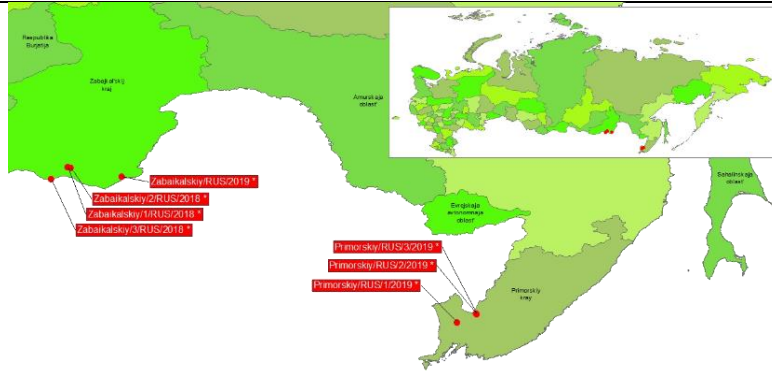
The content of this report is the property of WRLFMD®, The Pirbright Institute.

Copies of all the individual reports cited herein can be obtained from The Pirbright Institute and prior to presentation, publication or any other public use of these data, please contact Dr Donald King, The Pirbright Institute, donald.king@pirbright.ac.uk

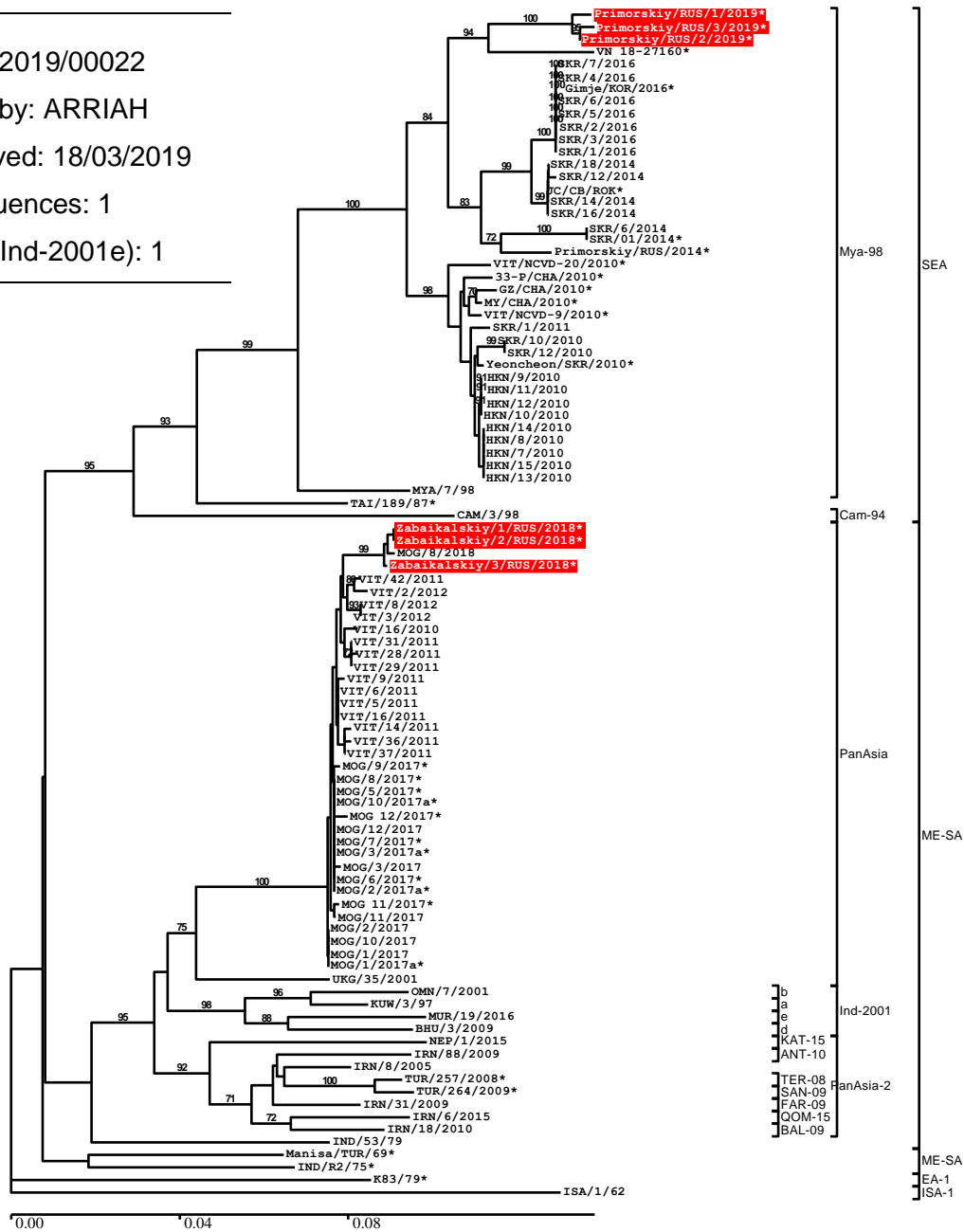


Russian Federation

Batch:
 WRLMEG/2019/00019
 Submitted by: ARRIAH
 Date received: 27/02/2019
 No. of sequences: 6
 O (ME-SA/PanAsia): 3
 O (SEA/Mya-98): 3



Batch:
 WRLMEG/2019/00022
 Submitted by: ARRIAH
 Date received: 18/03/2019
 No. of sequences: 1
 O (ME-SA/Ind-2001e): 1



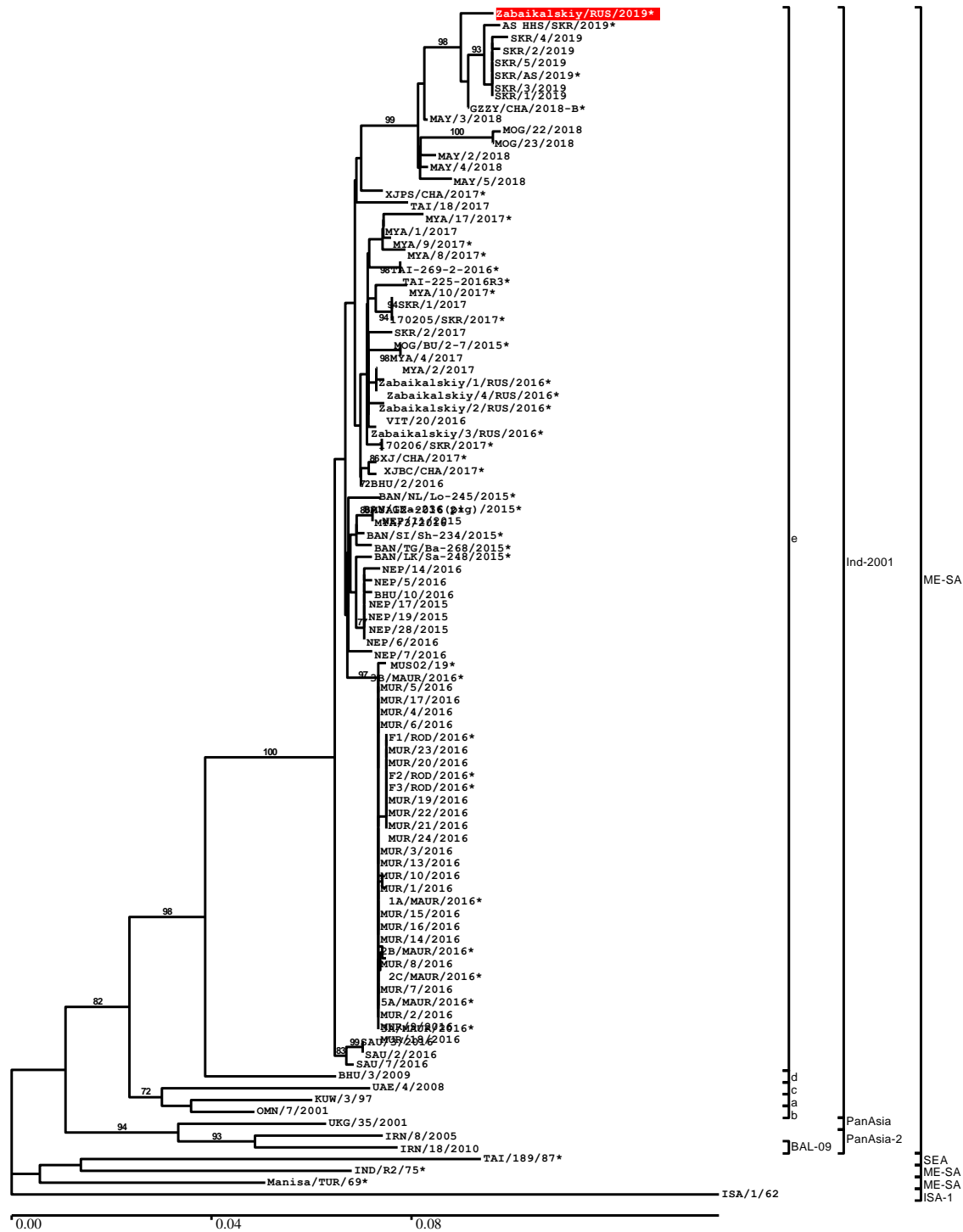
Continued on next page

The content of this report is the property of WRLFMD®, The Pirbright Institute.

Copies of all the individual reports cited herein can be obtained from The Pirbright Institute and prior to presentation, publication or any other public use of these data, please contact Dr Donald King, The Pirbright Institute, donald.king@pirbright.ac.uk

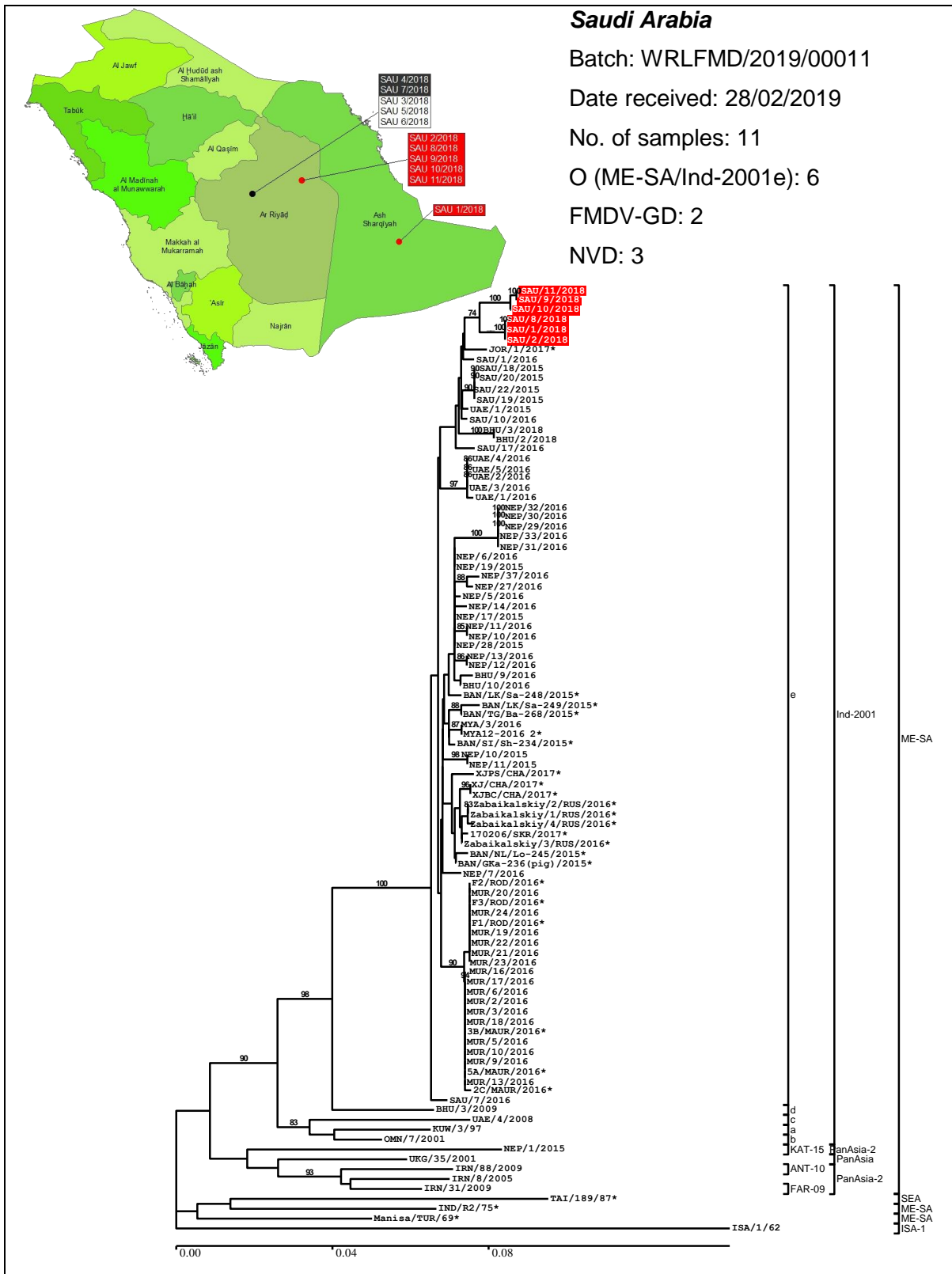


Russia continued



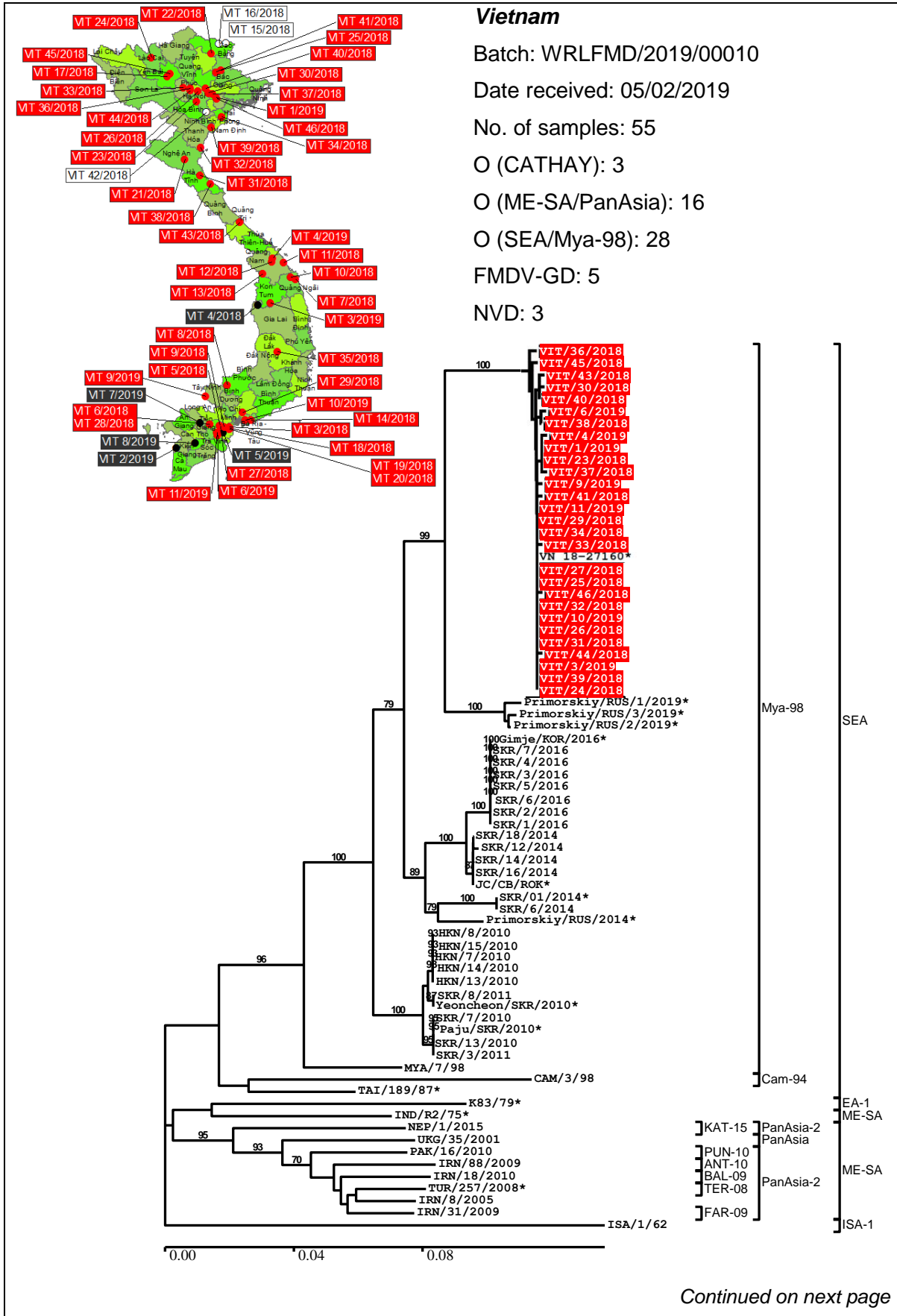
The content of this report is the property of WRLFMD®, The Pirbright Institute.

Copies of all the individual reports cited herein can be obtained from The Pirbright Institute and prior to presentation, publication or any other public use of these data, please contact Dr Donald King, The Pirbright Institute, donald.king@pirbright.ac.uk



The content of this report is the property of WRLFMD®, The Pirbright Institute.

Copies of all the individual reports cited herein can be obtained from The Pirbright Institute and prior to presentation, publication or any other public use of these data, please contact Dr Donald King, The Pirbright Institute, donald.king@pirbright.ac.uk

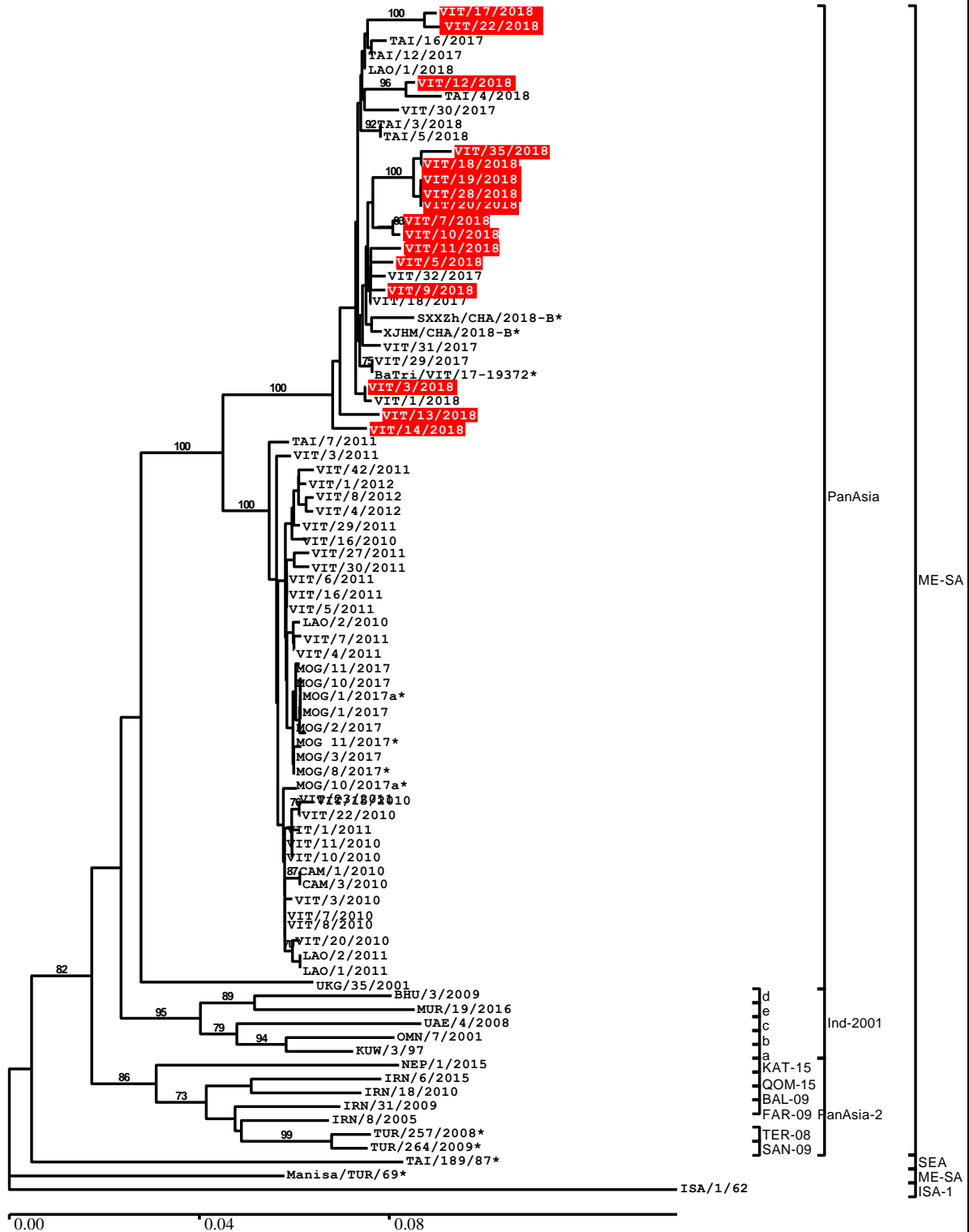


The content of this report is the property of WRLFMD®, The Pirbright Institute.

Copies of all the individual reports cited herein can be obtained from The Pirbright Institute and prior to presentation, publication or any other public use of these data, please contact Dr Donald King, The Pirbright Institute, donald.king@pirbright.ac.uk



Vietnam Continued



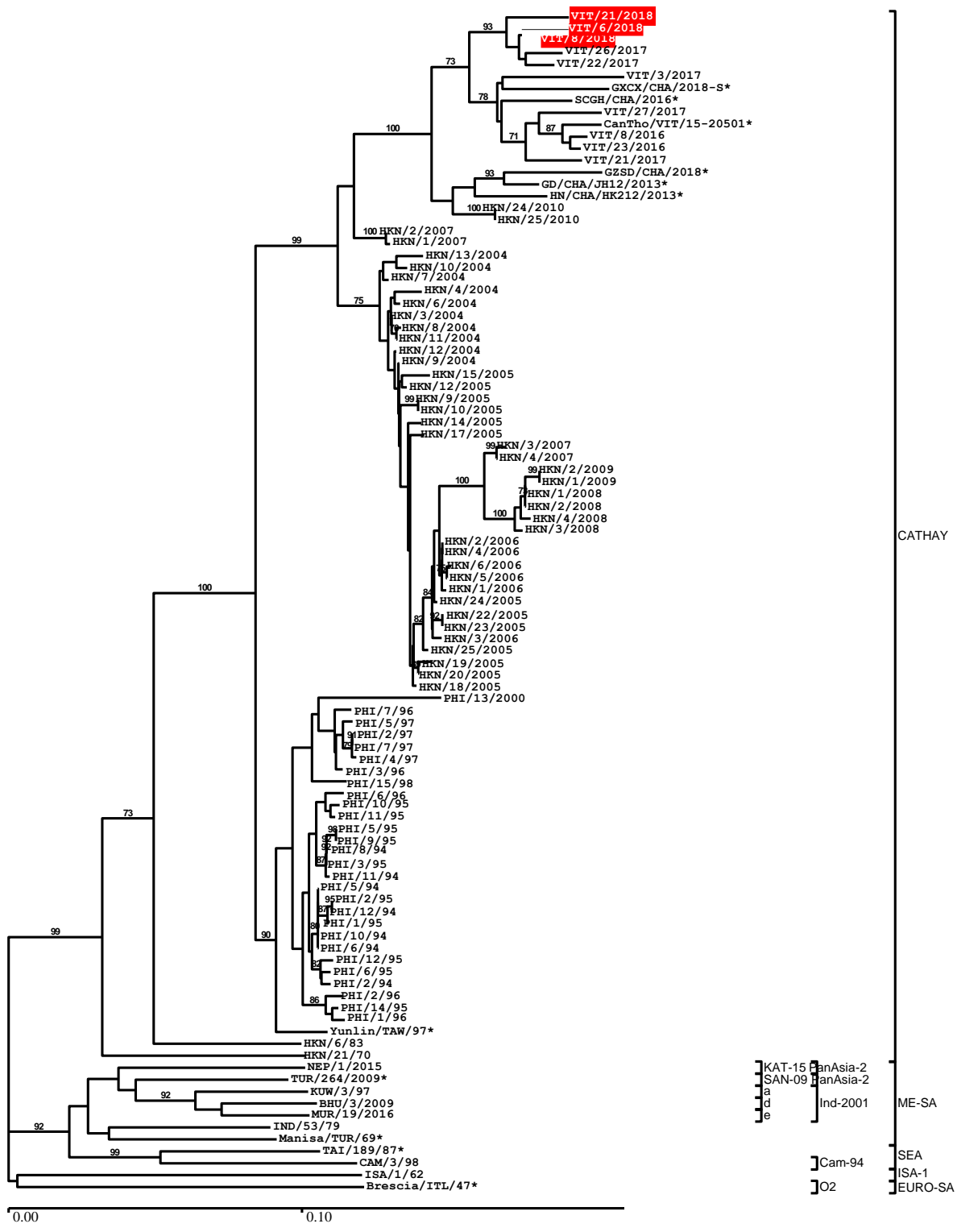
Continued on next page

The content of this report is the property of WRLFMD®, The Pirbright Institute.

Copies of all the individual reports cited herein can be obtained from The Pirbright Institute and prior to presentation, publication or any other public use of these data, please contact Dr Donald King, The Pirbright Institute, donald.king@pirbright.ac.uk



Vietnam Continued

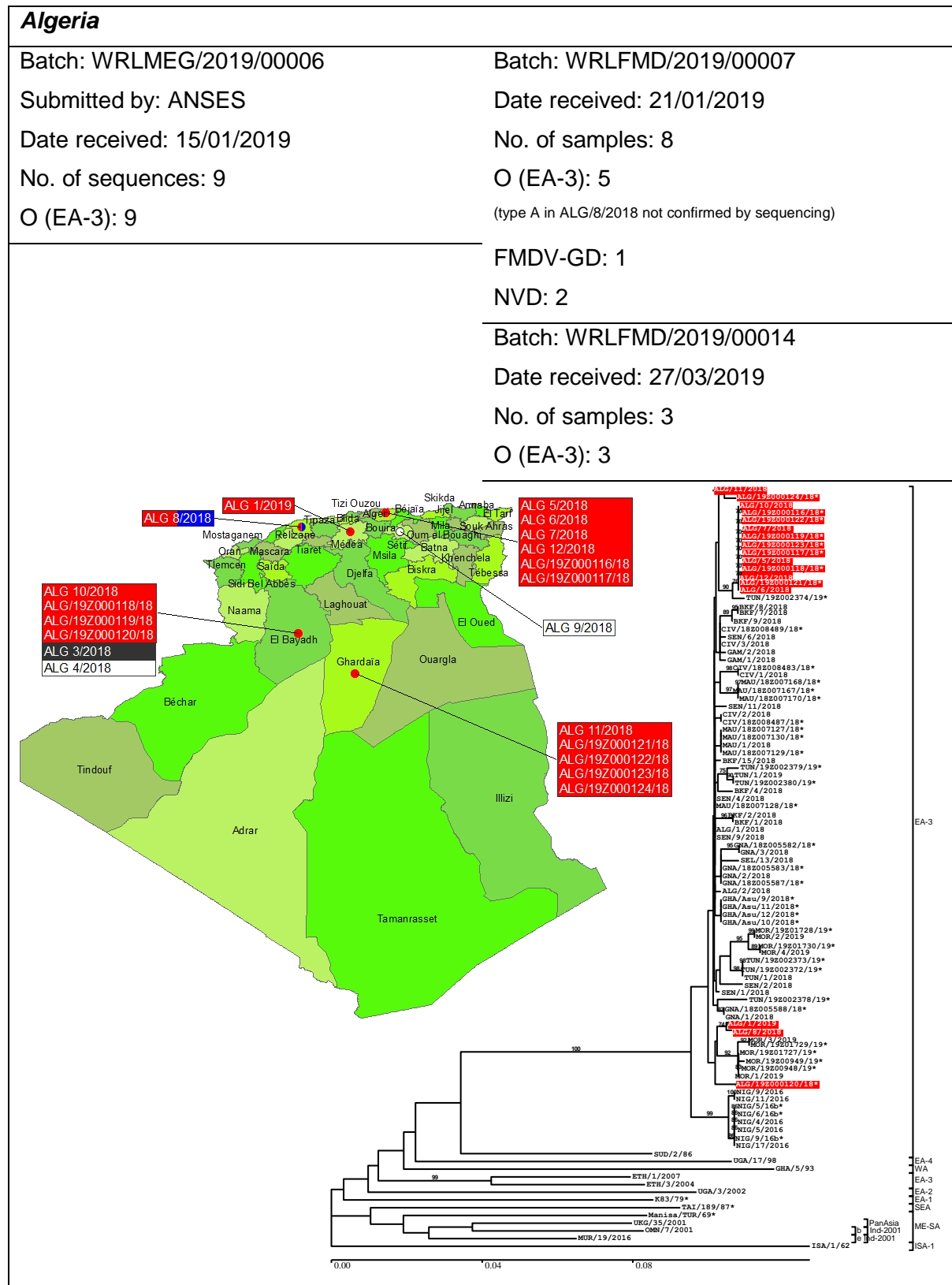


The content of this report is the property of WRLFMD®, The Pirbright Institute.

Copies of all the individual reports cited herein can be obtained from The Pirbright Institute and prior to presentation, publication or any other public use of these data, please contact Dr Donald King, The Pirbright Institute, donald.king@pirbright.ac.uk



2.2. Africa



The content of this report is the property of WRLFMD®, The Pirbright Institute.

Copies of all the individual reports cited herein can be obtained from The Pirbright Institute and prior to presentation, publication or any other public use of these data, please contact Dr Donald King, The Pirbright Institute, donald.king@pirbright.ac.uk



Côte d'Ivoire

Batch: WRLFMD/2019/00015

Date received: 27/03/2019

No. of samples: 3

O (EA-3): 3

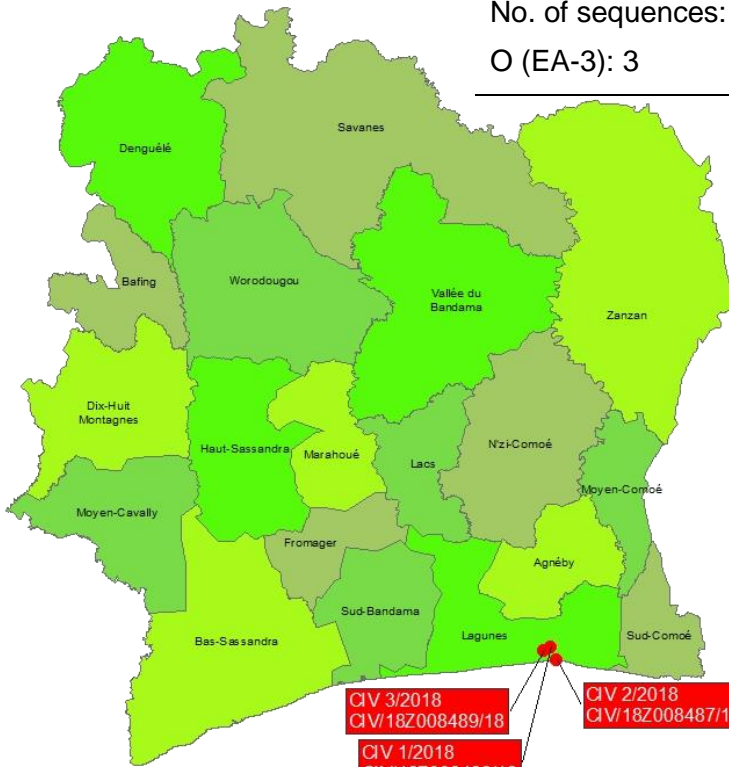
Batch: WRLMEG/2019/00007

Submitted by: ANSES

Date received: 16/01/2019

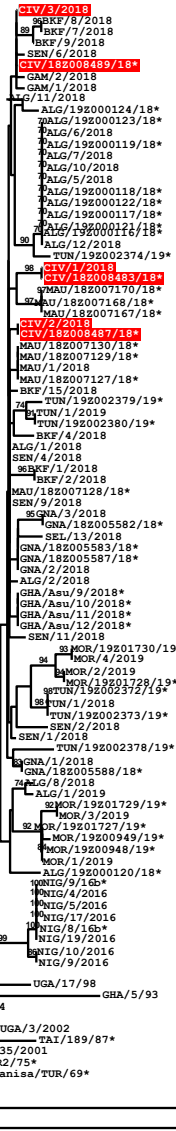
No. of sequences: 3

O (EA-3): 3



CIV 3/2018
CIV18Z008489/18
CIV 1/2018
CIV18Z008483/18

CIV 2/2018
CIV18Z008487/18



EA-3
EA-4
WA
EA-3
EA-2
SEA
ME-SA
ME-SA
EA-1
ISA-1

The content of this report is the property of WRLFMD®, The Pirbright Institute.

Copies of all the individual reports cited herein can be obtained from The Pirbright Institute and prior to presentation, publication or any other public use of these data, please contact Dr Donald King, The Pirbright Institute, donald.king@pirbright.ac.uk



Egypt

Batch: WRLFMD/2019/00005

Date received: 16/01/2019

No. of samples: 37

O (EA-3): 2

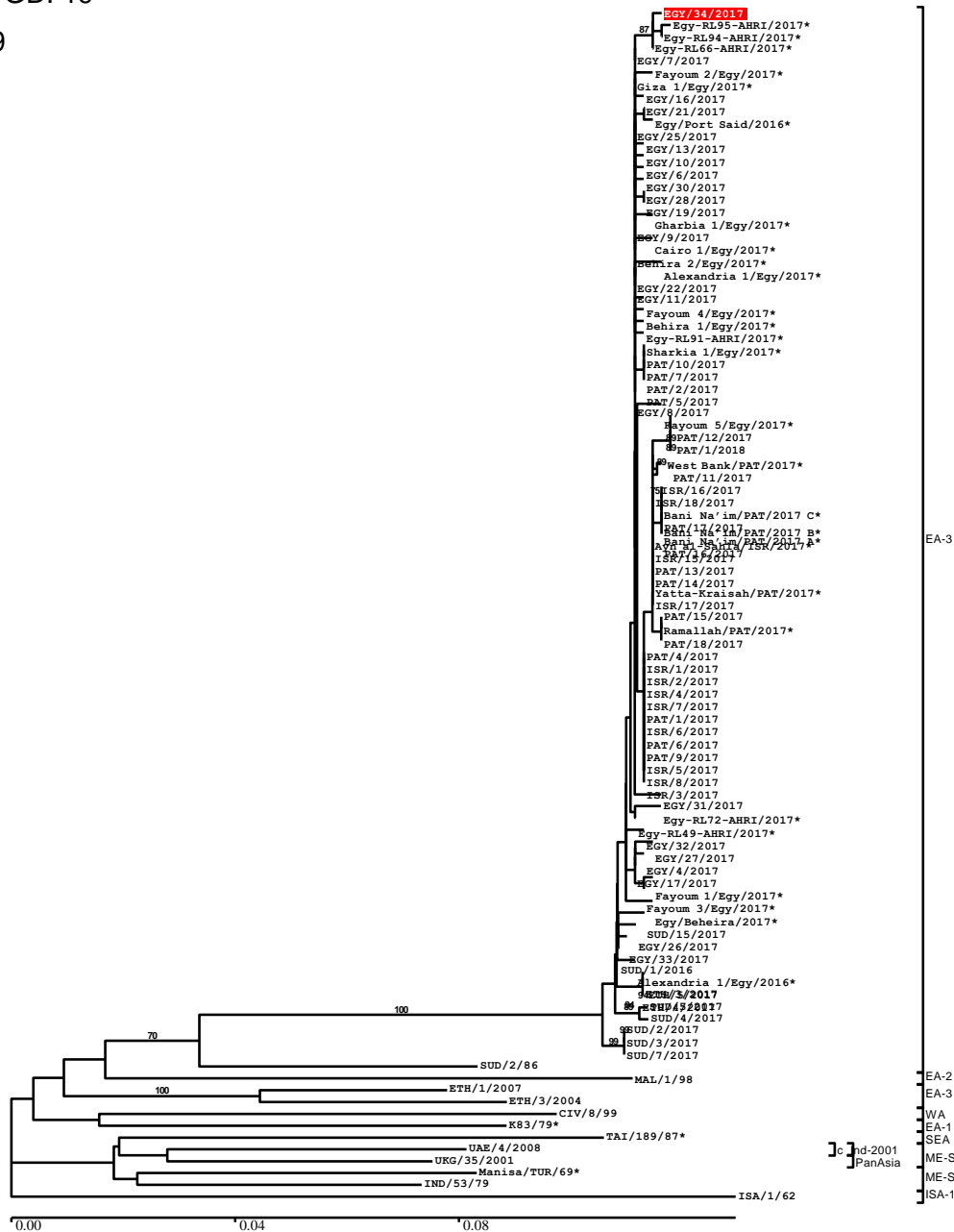
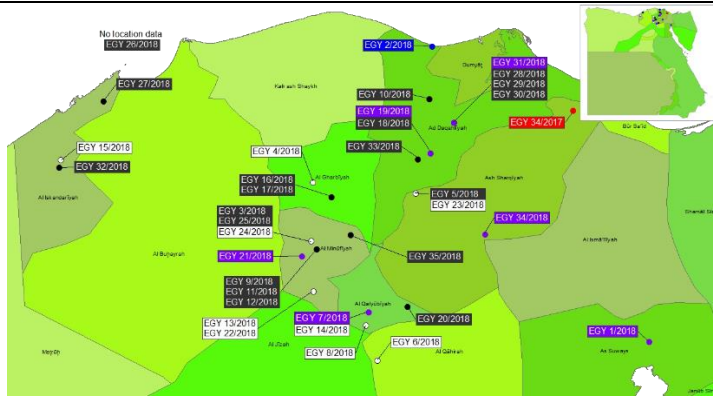
A (AFRICA/G-IV): 1

SAT2 (VII/Lib-12): 5

SAT2 (VII/GhB-12): 1

FMDV-GD: 19

NVD: 9



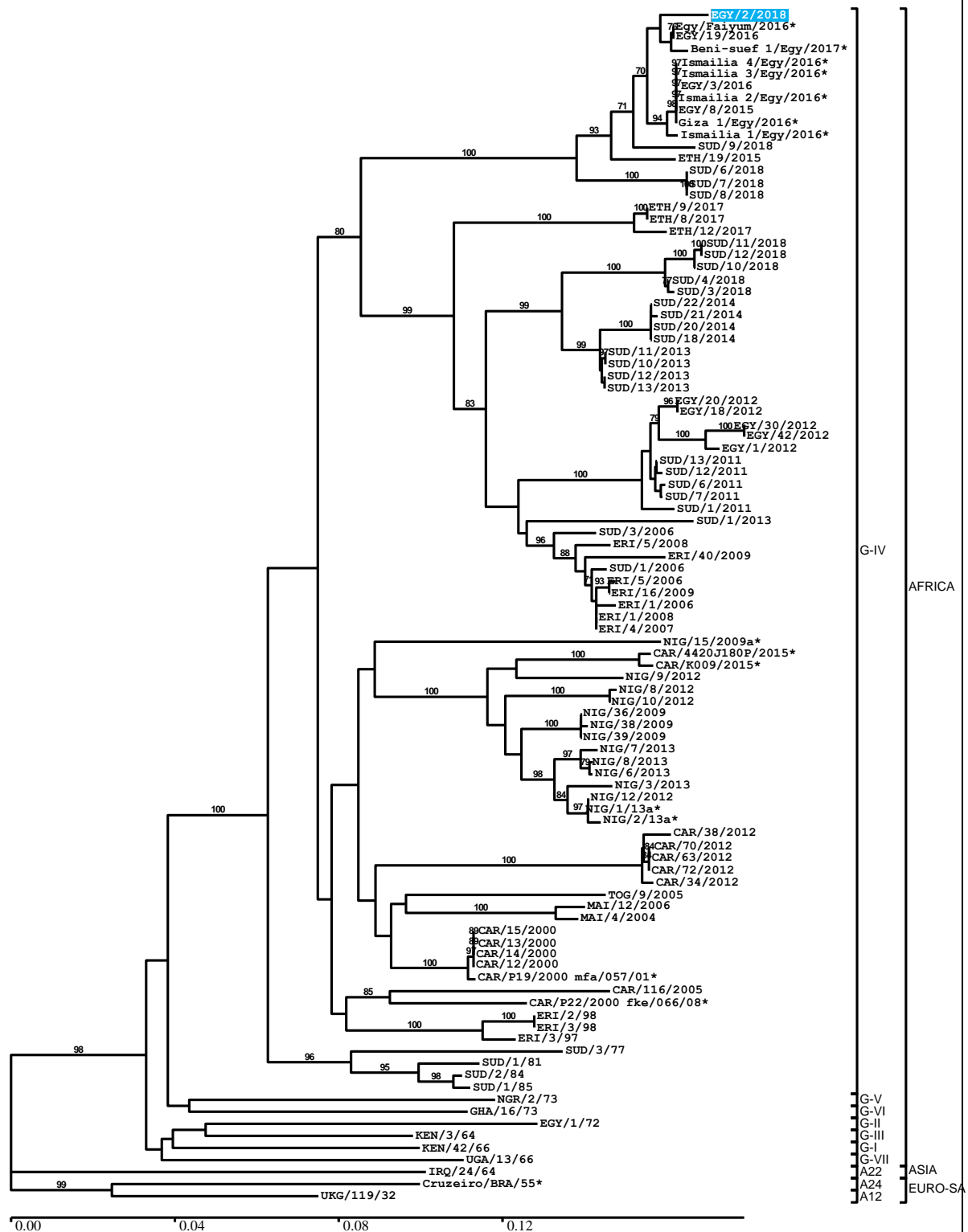
Continued on next page

The content of this report is the property of WRLFMD®, The Pirbright Institute.

Copies of all the individual reports cited herein can be obtained from The Pirbright Institute and prior to presentation, publication or any other public use of these data, please contact Dr Donald King, The Pirbright Institute, donald.king@pirbright.ac.uk



Egypt continued



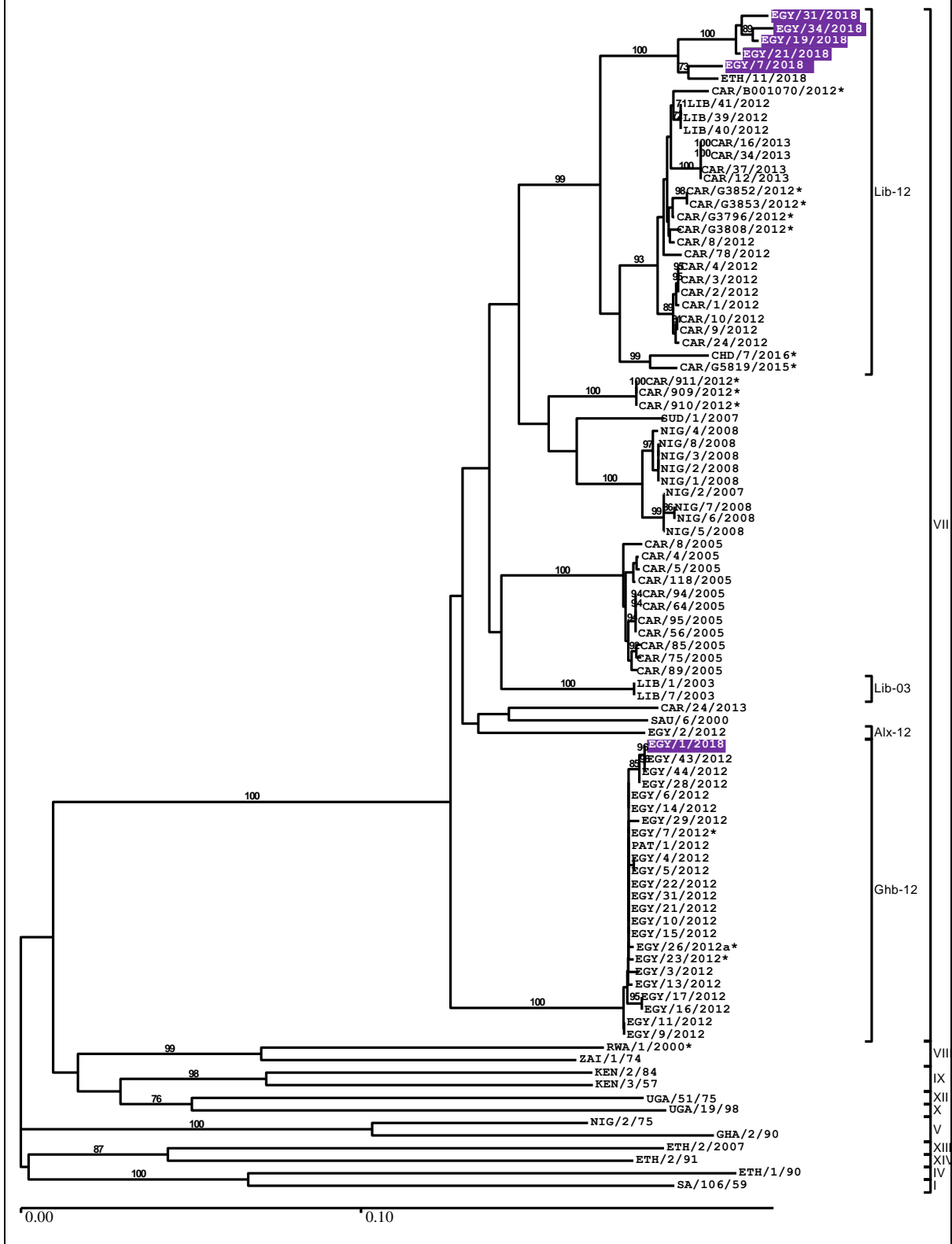
Continued on next page

The content of this report is the property of WRLFMD®, The Pirbright Institute.

Copies of all the individual reports cited herein can be obtained from The Pirbright Institute and prior to presentation, publication or any other public use of these data, please contact Dr Donald King, The Pirbright Institute, donald.king@pirbright.ac.uk



Egypt Continued



The content of this report is the property of WRLFMD®, The Pirbright Institute.

Copies of all the individual reports cited herein can be obtained from The Pirbright Institute and prior to presentation, publication or any other public use of these data, please contact Dr Donald King, The Pirbright Institute, donald.king@pirbright.ac.uk



Ethiopia

Batch: WRLFMD/2019/00001

Date received: 11/01/2019

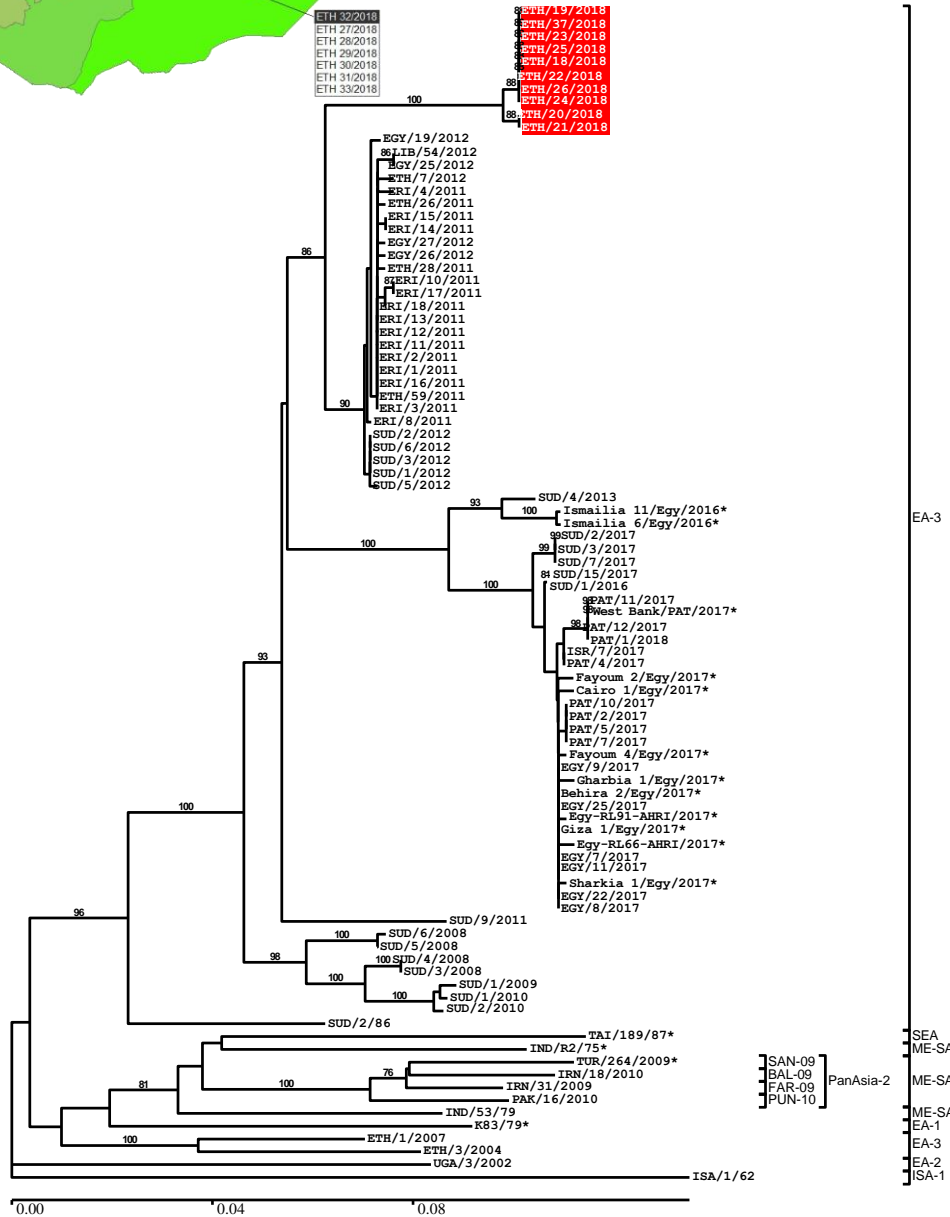
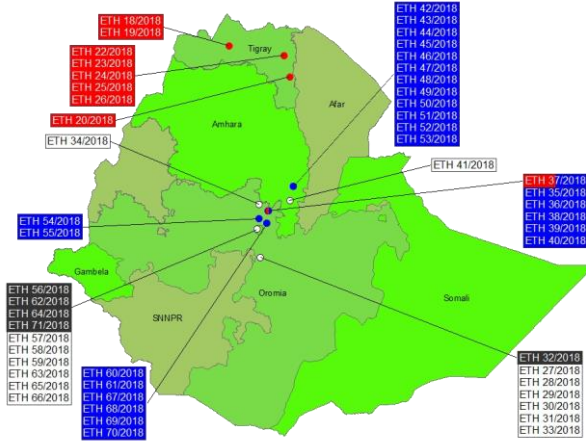
No. of samples: 55

O (EA-3): 10

A (AFRICA/G-IV): 26

FMDV-GD: 5

NVD: 14



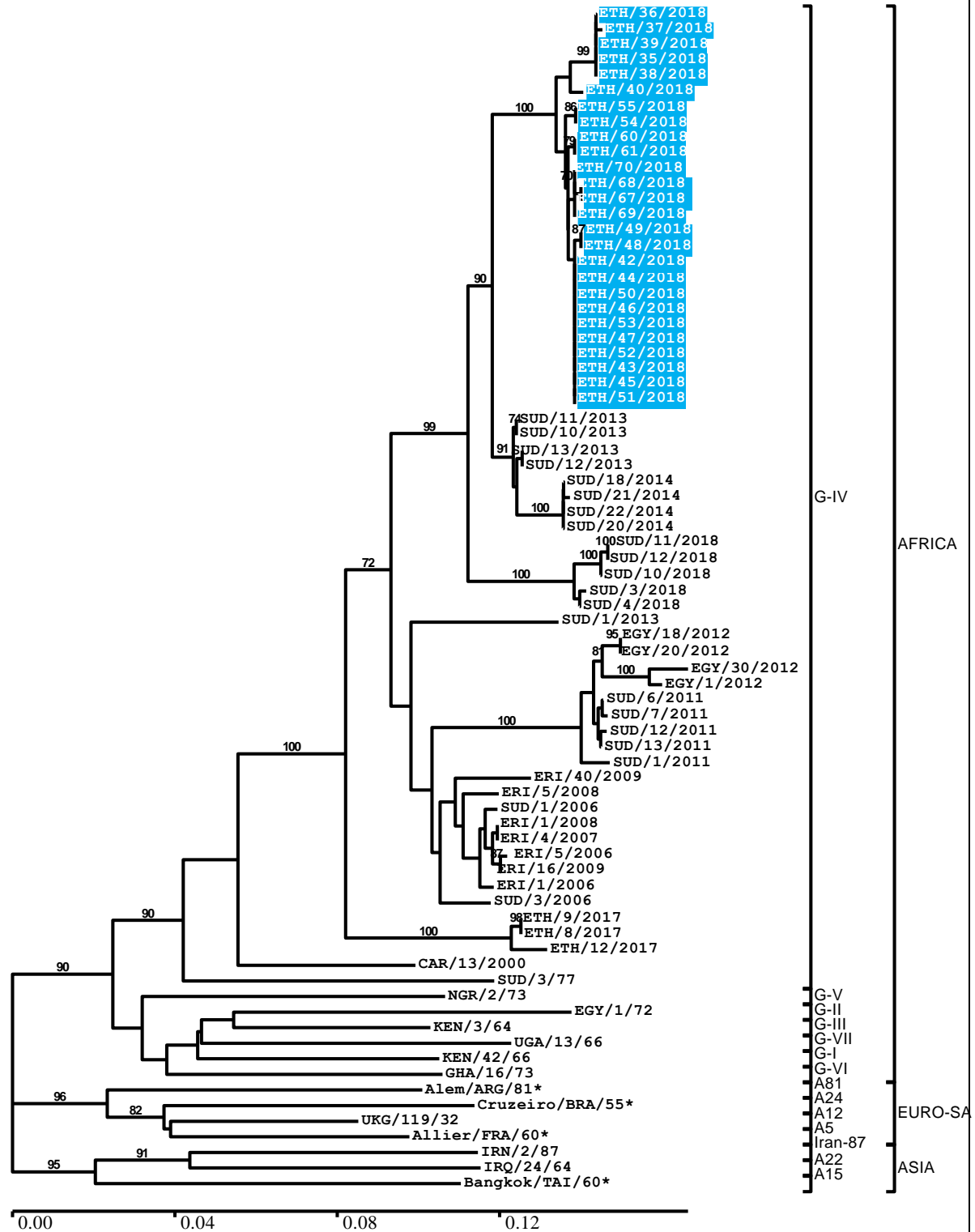
Continued on next page

The content of this report is the property of WRLFMD®, The Pirbright Institute.

Copies of all the individual reports cited herein can be obtained from The Pirbright Institute and prior to presentation, publication or any other public use of these data, please contact Dr Donald King, The Pirbright Institute, donald.king@pirbright.ac.uk



Ethiopia continued



The content of this report is the property of WRLFMD®, The Pirbright Institute.

Copies of all the individual reports cited herein can be obtained from The Pirbright Institute and prior to presentation, publication or any other public use of these data, please contact Dr Donald King, The Pirbright Institute, donald.king@pirbright.ac.uk



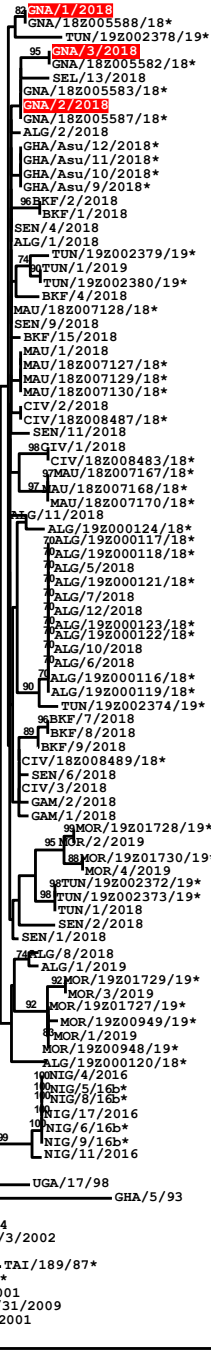
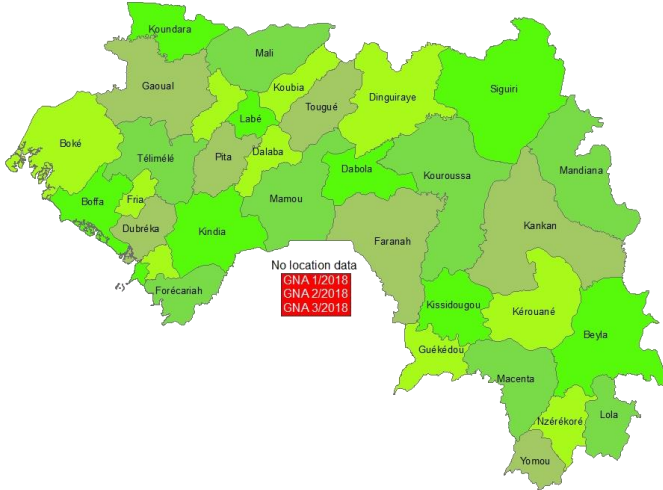
Guinea

Batch: WRLFMD/2019/00016

Date received: 27/03/2019

No. of samples: 3

O (EA-3): 3



0.00 0.04 0.08

EA-3
EA-4
WA
EA-3
EA-2
EA-1
SEA
ME-SA
ME-SA
FAR-09
PanAsia
PanAsia-2
Ind-2001
ISA-1

The content of this report is the property of WRLFMD®, The Pirbright Institute.

Copies of all the individual reports cited herein can be obtained from The Pirbright Institute and prior to presentation, publication or any other public use of these data, please contact Dr Donald King, The Pirbright Institute, donald.king@pirbright.ac.uk



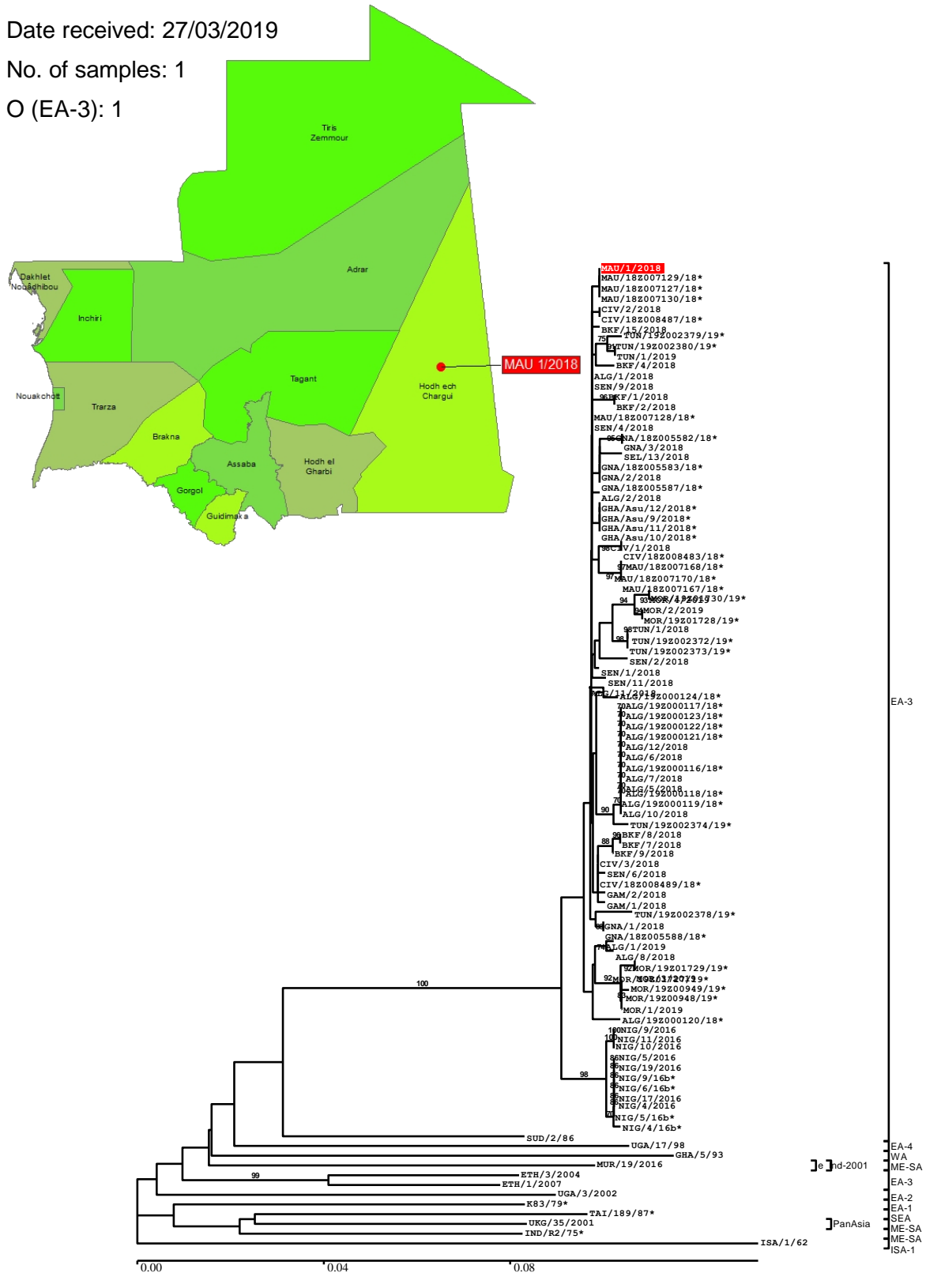
Mauritania

Batch: WRLFMD/2019/00017

Date received: 27/03/2019

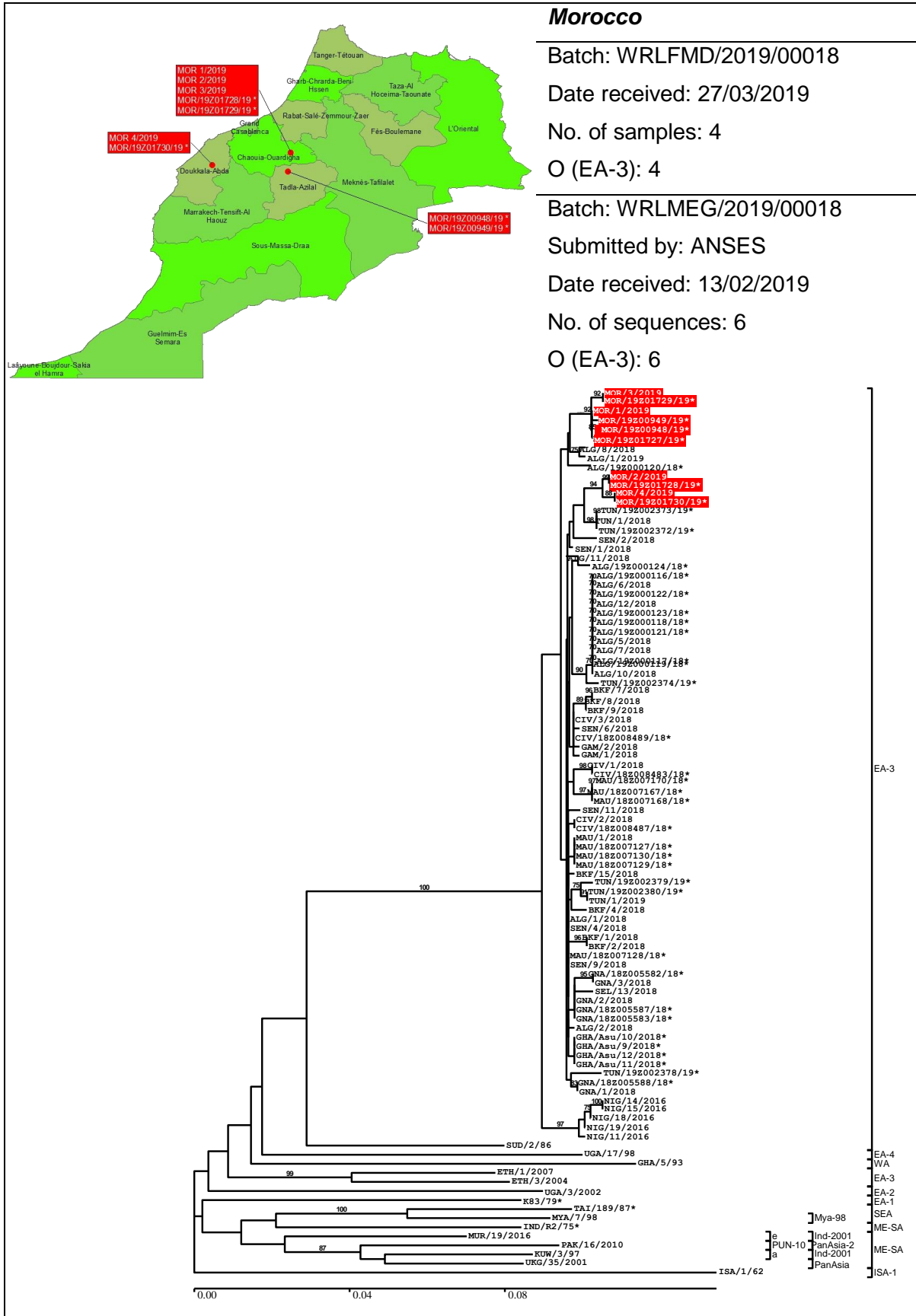
No. of samples: 1

O (EA-3): 1



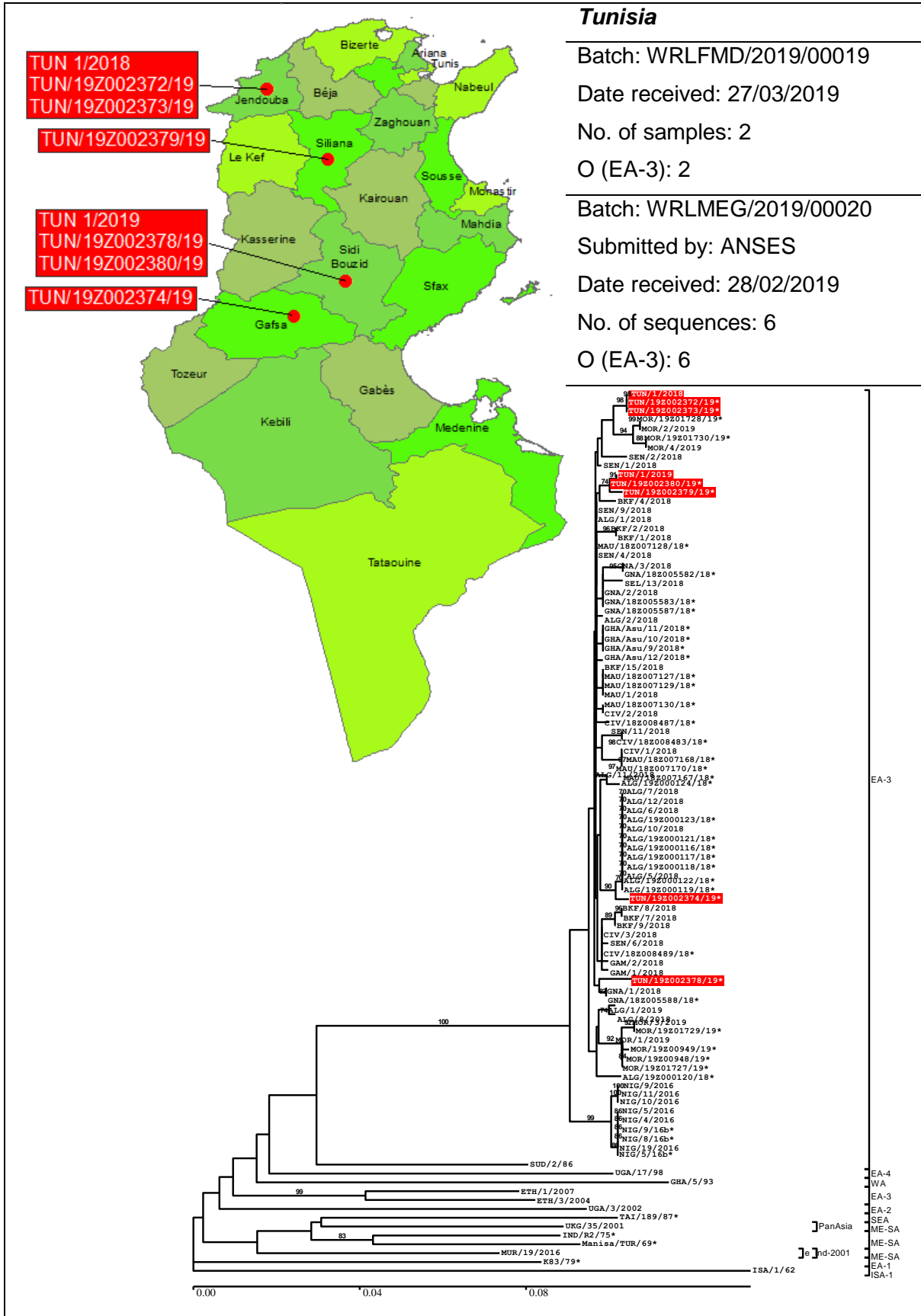
The content of this report is the property of WRLFMD®, The Pirbright Institute.

Copies of all the individual reports cited herein can be obtained from The Pirbright Institute and prior to presentation, publication or any other public use of these data, please contact Dr Donald King, The Pirbright Institute, donald.king@pirbright.ac.uk



The content of this report is the property of WRLFMD®, The Pirbright Institute.

Copies of all the individual reports cited herein can be obtained from The Pirbright Institute and prior to presentation, publication or any other public use of these data, please contact Dr Donald King, The Pirbright Institute, donald.king@pirbright.ac.uk



The content of this report is the property of WRLFMD®, The Pirbright Institute.

Copies of all the individual reports cited herein can be obtained from The Pirbright Institute and prior to presentation, publication or any other public use of these data, please contact Dr Donald King, The Pirbright Institute, donald.king@pirbright.ac.uk



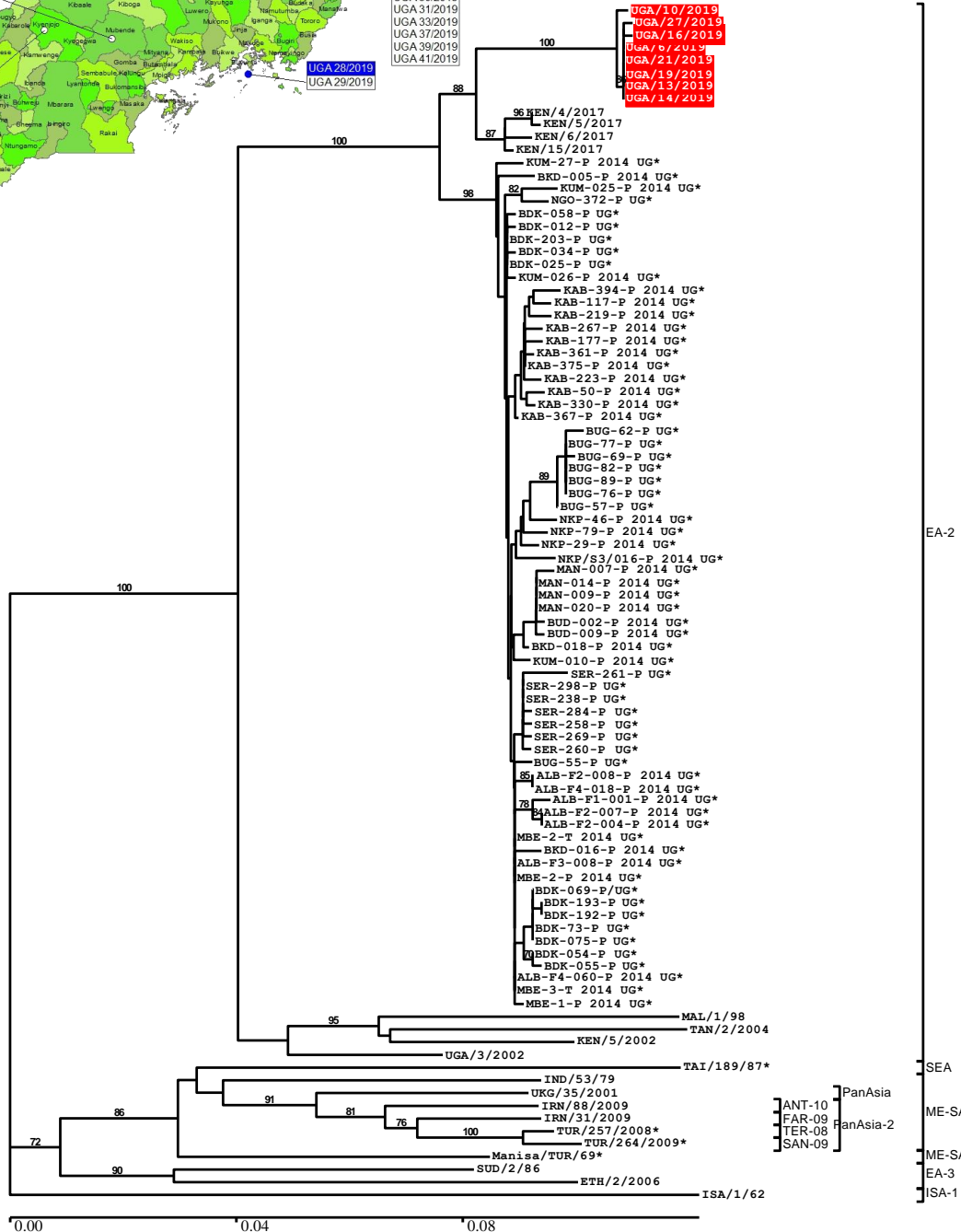
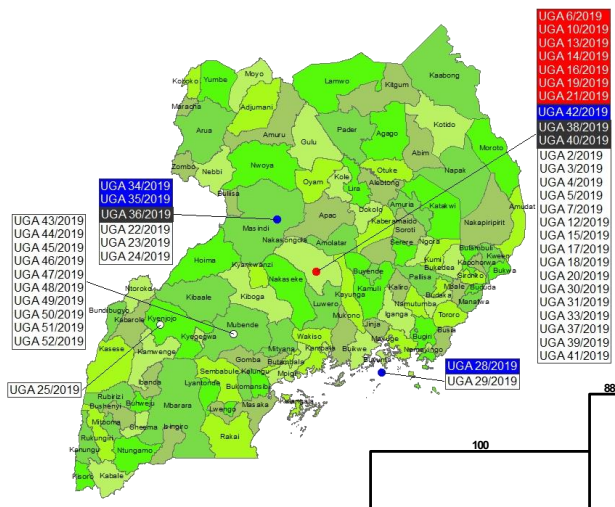
Uganda

Batch: WRLFMD/2019/00009

Date received: 12/02/2019

No. of samples: 52

O (EA-2): 8



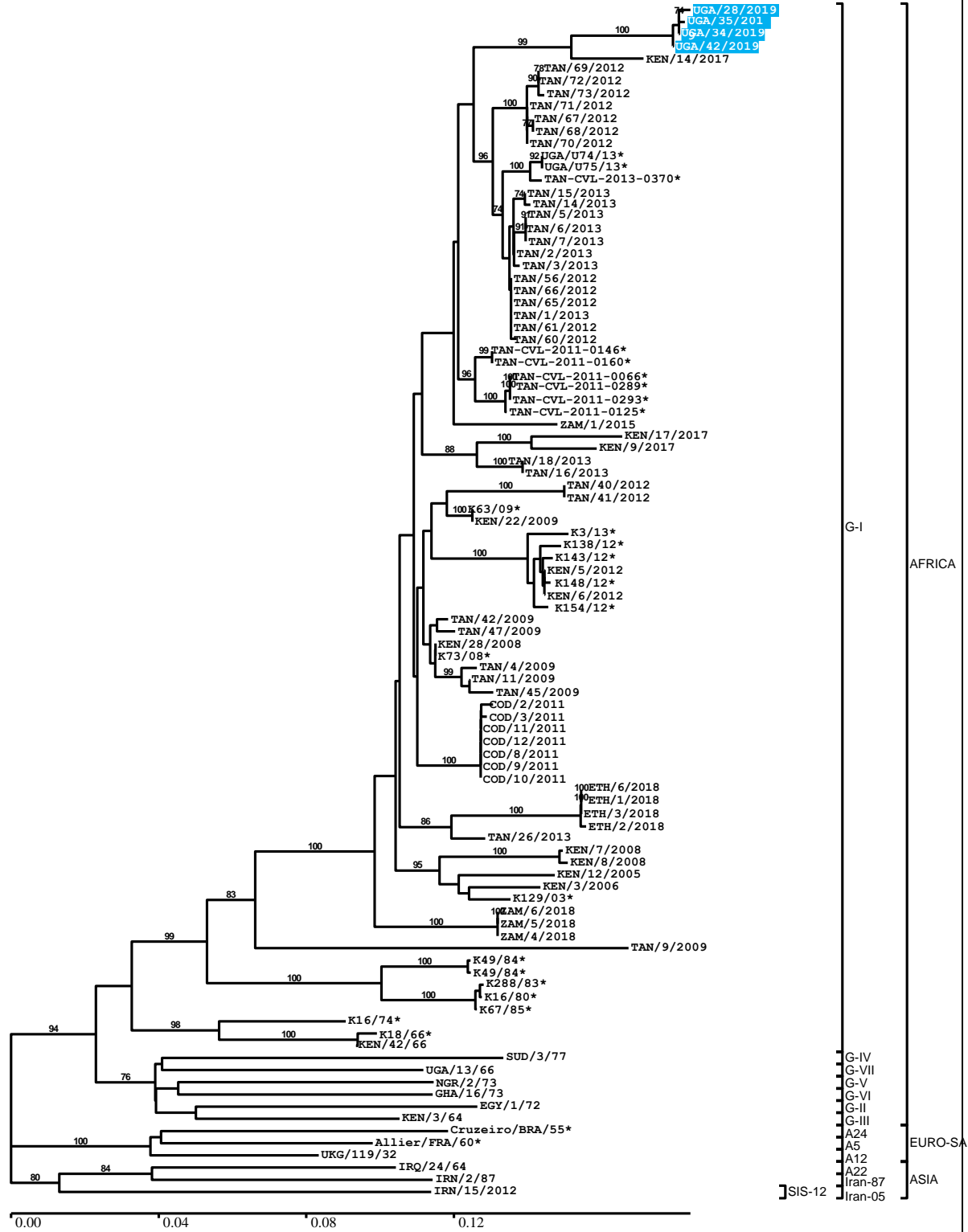
Continued on next page

The content of this report is the property of WRLFMD®, The Pirbright Institute.

Copies of all the individual reports cited herein can be obtained from The Pirbright Institute and prior to presentation, publication or any other public use of these data, please contact Dr Donald King, The Pirbright Institute, donald.king@pirbright.ac.uk

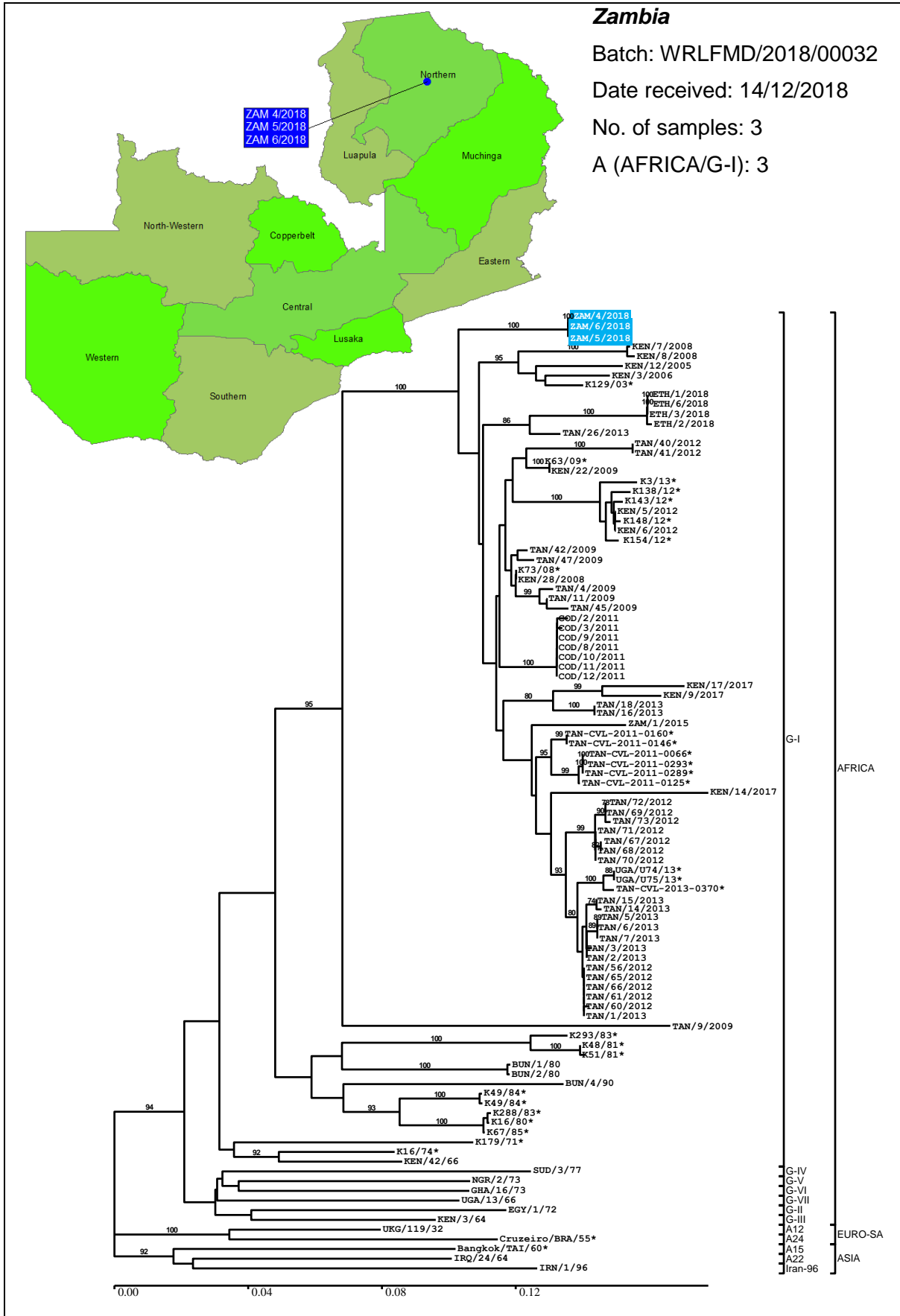


Uganda continued



The content of this report is the property of WRLFMD®, The Pirbright Institute.

Copies of all the individual reports cited herein can be obtained from The Pirbright Institute and prior to presentation, publication or any other public use of these data, please contact Dr Donald King, The Pirbright Institute, donald.king@pirbright.ac.uk



The content of this report is the property of WRLFMD®, The Pirbright Institute.

Copies of all the individual reports cited herein can be obtained from The Pirbright Institute and prior to presentation, publication or any other public use of these data, please contact Dr Donald King, The Pirbright Institute, donald.king@pirbright.ac.uk



2.3. Vaccine matching

During this reporting period vaccine matching has been undertaken for 28 FMD virus field strains by the WRLFMD® January to March 2019:

Table 3: Summary of samples tested by vaccine matching.

Serotype	O	A	C	Asia-1	SAT 1	SAT 2	SAT 3
Algeria	2	-	-	-	-	-	-
Burkina Faso	2	-	-	-	-	-	-
Hong Kong	2	-	-	-	-	-	-
Israel	5	-	-	-	-	-	-
Laos	1	-	-	-	-	-	-
Mongolia	3	-	-	-	-	-	-
Palestine, State of	1	-	-	-	-	-	-
Republic of Korea	2	-	-	-	-	-	-
Sierra Leone	1	-	-	-	-	-	-
South Sudan	1	-	-	-	-	-	-
Thailand	3	2	-	-	-	-	-
Zambia	-	2	-	-	-	-	-

For individual data see Annex 1, section 2.6 (Antigenic Characterisation).

The content of this report is the property of WRLFMD®, The Pirbright Institute.

Copies of all the individual reports cited herein can be obtained from The Pirbright Institute and prior to presentation, publication or any other public use of these data, please contact Dr Donald King, The Pirbright Institute, donald.king@pirbright.ac.uk



Annex 1: Sample data

2.4. Summary of Submissions

Table 4: Summary of samples collected and received to WRLFMD (January to March 2019)

Country	N ^o of samples	Virus isolation in cell culture/ELISA							No Virus Detected	RT-PCR for FMD	
		FMD virus serotypes								Positive	Negative
		O	A	C	SAT 1	SAT 2	SAT 3	ASIA -1			
Algeria	8	5	-	-	-	-	-	-	3	6	2
Egypt	36	1	1	-	-	6	-	-	28	27	9
Ethiopia*	54	10	26	-	-	-	-	-	19	35	19
Hong Kong	6	3	-	-	-	-	-	-	2	3	3
Israel	84	69	-	-	-	-	-	-	15	72	12
Mongolia	7	6	-	-	-	-	-	-	1	6	1
Palestine, State of	1	1	-	-	-	-	-	-	-	1	-
Saudi Arabia	11	6	-	-	-	-	-	-	5	8	3
South Korea	5	5	-	-	-	-	-	-	-	5	-
Uganda	52	8	4	-	-	-	-	-	4-	7	45
Vietnam	55	47	-	-	-	-	-	-	8	52	3
TOTAL	319	161	31	-	-	6	-	-	121	222	97

*One samples from Ethiopia had a mixed serotype result of A and O.

Abbreviations used in table

VI / ELISA	FMD (or SVD) virus serotype identified following virus isolation in cell culture and antigen detection ELISA
FMD	Foot-and-mouth disease
SVD	Swine vesicular disease
NVD	No FMD, SVD or vesicular stomatitis virus detected
NT	Not tested
rRT-PCR	Real-time reverse transcription polymerase chain reaction for FMD (or SVD) viral genome

The content of this report is the property of WRLFMD®, The Pirbright Institute.

Copies of all the individual reports cited herein can be obtained from The Pirbright Institute and prior to presentation, publication or any other public use of these data, please contact Dr Donald King, The Pirbright Institute, donald.king@pirbright.ac.uk



2.5. Clinical Samples

Table 5: Clinical sample diagnostics made by the WRLFMD® January to March 2019

Country	Date		WRL for FMD Sample Identification	Animal	Date of Collection	Results		
	Received	Reported				V/ELISA	RT-PCR	Final report
Algeria			ALG 3/2018	CATTLE	25-Dec-18	NEG	POS	FMDV GD
			ALG 4/2018	CATTLE	26-Dec-18	NEG	NEG	NVD
			ALG 5/2018	CATTLE	30-Dec-18	O	POS	O
			ALG 6/2018	CATTLE	30-Dec-18	O	POS	O
			ALG 7/2018	CATTLE	30-Dec-18	O	POS	O
			ALG 8/2018	CATTLE	31-Dec-18	O	POS	O
			ALG 9/2018	SHEEP	31-Dec-18	NEG	NEG	NVD
			ALG 1/2019	CATTLE	08-Jan-19	O	POS	O
Egypt			EGY 34/2017	CATTLE	22-Jan-17	O	POS	O
			EGY 1/2018	CATTLE	20-Jan-18	SAT 2	POS	SAT 2
			EGY 2/2018	CATTLE	04-Feb-18	A	POS	A
			EGY 3/2018	BUFFALO	13-Feb-18	NEG	POS	FMDV GD
			EGY 4/2018	BUFFALO	15-Feb-18	NEG	NEG	NVD
			EGY 5/2018	CATTLE	21-Feb-18	NEG	POS	FMDV GD
			EGY 6/2018	CATTLE	03-Mar-18	NEG	NEG	NVD
			EGY 7/2018	CATTLE	22-Apr-18	SAT 2	POS	SAT 2
			EGY 8/2018	CATTLE	30-Apr-18	NEG	NEG	NVD
			EGY 9/2018	CATTLE	07-May-18	NEG	POS	FMDV GD
			EGY 10/2018	CATTLE	22-May-18	NEG	POS	FMDV GD
			EGY 11/2018	CATTLE	24-May-18	NEG	POS	FMDV GD
			EGY 12/2018	CATTLE	24-May-18	NEG	POS	FMDV GD
			EGY 13/2018	BUFFALO	21-Jun-18	NEG	NEG	NVD
			EGY 14/2018	BUFFALO	27-Jun-18	NEG	NEG	NVD
			EGY 15/2018	CATTLE	03-Jul-18	NEG	NEG	NVD
			EGY 16/2018	BUFFALO	02-Aug-18	NEG	POS	FMDV GD
			EGY 17/2018	BUFFALO	02-Aug-18	NEG	POS	FMDV GD
			EGY 18/2018	CATTLE	28-Aug-18	NEG	POS	FMDV GD
			EGY 19/2018	CATTLE	28-Aug-18	SAT 2	POS	SAT 2
			EGY 20/2018	CATTLE	04-Sep-18	NEG	POS	FMDV GD
			EGY 21/2018	CATTLE	04-Oct-18	SAT 2	POS	SAT 2
			EGY 22/2018	CATTLE	21-Oct-18	NEG	NEG	NVD
			EGY 23/2018	CATTLE	22-Oct-18	NEG	NEG	NVD
			EGY 24/2018	CATTLE	24-Oct-18	NEG	NEG	NVD
			EGY 25/2018	CATTLE	24-Oct-18	NEG	POS	FMDV GD
			EGY 26/2018	CATTLE	25-Oct-18	NEG	POS	FMDV GD
			EGY 27/2018	CATTLE	01-Nov-18	NEG	POS	FMDV GD
			EGY 28/2018	BUFFALO	04-Nov-18	NEG	POS	FMDV GD
			EGY 29/2018	BUFFALO	04-Nov-18	NEG	POS	FMDV GD
			EGY 30/2018	CATTLE	04-Nov-18	NEG	POS	FMDV GD
			EGY 31/2018	CATTLE	04-Nov-18	SAT 2	POS	SAT 2
			EGY 32/2018	BUFFALO	06-Nov-18	NEG	POS	FMDV GD
			EGY 33/2018	CATTLE	06-Nov-18	NEG	POS	FMDV GD
			EGY 34/2018	CATTLE	10-Nov-18	SAT 2	POS	SAT 2
		EGY 35/2018	CATTLE	11-Nov-18	NEG	POS	FMDV GD	

The content of this report is the property of WRLFMD®, The Pirbright Institute.

Copies of all the individual reports cited herein can be obtained from The Pirbright Institute and prior to presentation, publication or any other public use of these data, please contact Dr Donald King, The Pirbright Institute, donald.king@pirbright.ac.uk



Country	Date		WRL for FMD Sample Identification	Animal	Date of Collection	Results		
	Received	Reported				V/ELISA	RT-PCR	Final report
Ethiopia	11-Jan-2019	05-Mar-2019	ETH 18/2018	CATTLE	29-Aug-18	O	POS	O
			ETH 19/2018	CATTLE	29-Aug-18	O	POS	O
			ETH 20/2018	CATTLE	11-Sep-18	O	POS	O
			ETH 21/2018	CATTLE	11-Sep-18	O	POS	O
			ETH 22/2018	CATTLE	17-Sep-18	O	POS	O
			ETH 23/2018	CATTLE	17-Sep-18	O	POS	O
			ETH 24/2018	CATTLE	18-Sep-18	O	POS	O
			ETH 25/2018	CATTLE	18-Sep-18	O	POS	O
			ETH 26/2018	CATTLE	18-Sep-18	O	POS	O
			ETH 27/2018	CATTLE	25-Sep-18	NEG	NEG	NVD
			ETH 28/2018	CATTLE	25-Sep-18	NEG	NEG	NVD
			ETH 29/2018	CATTLE	28-Sep-18	NEG	NEG	NVD
			ETH 30/2018	CATTLE	18-Oct-18	NEG	NEG	NVD
			ETH 31/2018	CATTLE	18-Oct-18	NEG	NEG	NVD
			ETH 32/2018	CATTLE	18-Oct-18	NEG	POS	FMDV GD
			ETH 33/2018	CATTLE	18-Oct-18	NEG	NEG	NVD
			ETH 34/2018	CATTLE	18-Oct-18	NEG	NEG	NVD
			ETH 35/2018	CATTLE	22-Oct-18	A	POS	A
			ETH 36/2018	CATTLE	22-Oct-18	A	NEG	A
			ETH 37/2018	CATTLE	22-Oct-18	FMD, A, O	POS	A, O
			ETH 38/2018	CATTLE	22-Oct-18	A	POS	A
			ETH 39/2018	CATTLE	22-Oct-18	A	POS	A
			ETH 40/2018	CATTLE	22-Oct-18	A	POS	A
			ETH 41/2018	CATTLE	22-Oct-18	NEG	NEG	NVD
			ETH 42/2018	CATTLE	02-Nov-18	A	POS	A
			ETH 43/2018	CATTLE	02-Nov-18	A	POS	A
			ETH 44/2018	CATTLE	02-Nov-18	A	POS	A
			ETH 45/2018	CATTLE	02-Nov-18	A	NEG	A
			ETH 46/2018	CATTLE	02-Nov-18	A	POS	A
			ETH 47/2018	CATTLE	02-Nov-18	A	POS	A
			ETH 48/2018	CATTLE	02-Nov-18	A	POS	A
			ETH 49/2018	CATTLE	02-Nov-18	A	NEG	A
			ETH 50/2018	CATTLE	02-Nov-18	A	POS	A
			ETH 51/2018	CATTLE	02-Nov-18	A	POS	A
			ETH 52/2018	CATTLE	02-Nov-18	A	POS	A
			ETH 53/2018	CATTLE	02-Nov-18	A	NEG	A
			ETH 54/2018	CATTLE	08-Nov-18	A	POS	A
			ETH 55/2018	CATTLE	08-Nov-18	A	POS	A
			ETH 56/2018	CATTLE	08-Nov-18	NEG	POS	FMDV GD
			ETH 57/2018	CATTLE	08-Nov-18	NEG	NEG	NVD
			ETH 58/2018	CATTLE	08-Nov-18	NEG	NEG	NVD
			ETH 59/2018	CATTLE	08-Nov-18	NEG	NEG	NVD
			ETH 60/2018	CATTLE	08-Nov-18	A	POS	A
			ETH 61/2018	CATTLE	08-Nov-18	A	POS	A
			ETH 62/2018	CATTLE	08-Nov-18	NEG	POS	FMDV GD
			ETH 63/2018	CATTLE	04-Dec-18	NEG	NEG	NVD
			ETH 64/2018	CATTLE	04-Dec-18	NEG	POS	FMDV GD

The content of this report is the property of WRLFMD®, The Pirbright Institute.

Copies of all the individual reports cited herein can be obtained from The Pirbright Institute and prior to presentation, publication or any other public use of these data, please contact Dr Donald King, The Pirbright Institute, donald.king@pirbright.ac.uk



Country	Date		WRL for FMD Sample Identification	Animal	Date of Collection	Results		
	Received	Reported				V/ELISA	RT-PCR	Final report
			ETH 65/2018	CATTLE	04-Dec-18	NEG	NEG	NVD
			ETH 66/2018	CATTLE	04-Dec-18	NEG	NEG	NVD
			ETH 67/2018	CATTLE	04-Dec-18	A	POS	A
			ETH 68/2018	CATTLE	04-Dec-18	A	NEG	A
			ETH 69/2018	CATTLE	04-Dec-18	A	POS	A
			ETH 70/2018	CATTLE	04-Dec-18	A	POS	A
			ETH 71/2018	CATTLE	04-Dec-18	NEG	POS	FMDV GD
Hong Kong	16-Jan-2019	08-Feb-2019	HKN 18/2018	PIG	27-Sep-18	FMD	NEG	FMD
			HKN 19/2018	PIG	04-Oct-18	NEG	NEG	NVD
			HKN 20/2018	PIG	04-Oct-18	FMD, O	POS	O
			HKN 21/2018	PIG	18-Oct-18	FMD, O	POS	O
			HKN 22/2018	PIG	18-Oct-18	NEG	NEG	NVD
			HKN 23/2018	PIG	06-Dec-18	FMD, O	POS	O
Israel	15-Jan-2019	08-Feb-2019	ISR 5/2018	CATTLE	26-Apr-18	NEG	NEG	NVD
			ISR 6/2018	CATTLE	26-Apr-18	NEG	NEG	NVD
			ISR 7/2018	CATTLE	26-Apr-18	O	POS	O
			ISR 8/2018	GAZELLE	27-Apr-18	O	POS	O
			ISR 9/2018	GAZELLE	27-Apr-18	O	POS	O
			ISR 10/2018	CATTLE	28-Apr-18	O	POS	O
			ISR 11/2018	CATTLE	28-Apr-18	O	POS	O
			ISR 12/2018	CATTLE	28-Apr-18	O	POS	O
			ISR 13/2018	GAZELLE	28-Apr-18	O	POS	O
			ISR 14/2018	GAZELLE	28-Apr-18	O	POS	O
			ISR 15/2018	GAZELLE	28-Apr-18	O	NEG	O
			ISR 16/2018	GAZELLE	28-Apr-18	O	POS	O
			ISR 17/2018	GAZELLE	28-Apr-18	NEG	POS	FMDV GD
			ISR 18/2018	GAZELLE	29-Apr-18	NEG	NEG	NVD
			ISR 19/2018	GAZELLE	29-Apr-18	NEG	NEG	NVD
			ISR 20/2018	GAZELLE	29-Apr-18	O	POS	O
			ISR 21/2018	DEER	01-May-18	NEG	NEG	NVD
			ISR 22/2018	CATTLE	01-May-18	NEG	NEG	NVD
			ISR 23/2018	DEER	02-May-18	NEG	NEG	NVD
			ISR 24/2018	CATTLE	02-May-18	NEG	NEG	NVD
			ISR 25/2018	CATTLE	03-May-18	O	POS	O
			ISR 26/2018	CATTLE	03-May-18	O	POS	O
			ISR 27/2018	CATTLE	06-May-18	O	POS	O
			ISR 28/2018	CATTLE	07-May-18	O	POS	O
			ISR 29/2018	CATTLE	07-May-18	O	POS	O
			ISR 30/2018	CATTLE	07-May-18	O	POS	O
			ISR 31/2018	CATTLE	10-May-18	O	POS	O
			ISR 32/2018	CATTLE	10-May-18	O	POS	O
			ISR 33/2018	CATTLE	16-May-18	O	POS	O
			ISR 34/2018	CATTLE	16-May-18	O	POS	O
			ISR 35/2018	SHEEP	10-Jul-18	O	POS	O
			ISR 36/2018	SHEEP	10-Jul-18	O	POS	O
			ISR 37/2018	SHEEP	10-Jul-18	O	NEG	O

The content of this report is the property of WRLFMD®, The Pirbright Institute.

Copies of all the individual reports cited herein can be obtained from The Pirbright Institute and prior to presentation, publication or any other public use of these data, please contact Dr Donald King, The Pirbright Institute, donald.king@pirbright.ac.uk



Country	Date		WRL for FMD Sample Identification	Animal	Date of Collection	Results		
	Received	Reported				VI/ELISA	RT-PCR	Final report
			ISR 38/2018	SHEEP	12-Jul-18	O	POS	O
			ISR 39/2018	SHEEP	12-Jul-18	O	POS	O
			ISR 40/2018	SHEEP	12-Jul-18	O	POS	O
			ISR 41/2018	CATTLE	08-Sep-18	O	NEG	O
			ISR 42/2018	CATTLE	08-Sep-18	O	POS	O
			ISR 43/2018	CATTLE	08-Sep-18	O	POS	O
			ISR 44/2018	CATTLE	08-Sep-18	NEG	POS	FMDV GD
			ISR 45/2018	CATTLE	13-Sep-18	O	POS	O
			ISR 46/2018	CATTLE	13-Sep-18	O	POS	O
			ISR 47/2018	CATTLE	13-Sep-18	O	POS	O
			ISR 48/2018	CATTLE	13-Sep-18	O	POS	O
			ISR 49/2018	CATTLE	27-Sep-18	NEG	POS	FMDV GD
			ISR 50/2018	CATTLE	28-Sep-18	NEG	POS	FMDV GD
			ISR 51/2018	CATTLE	20-Nov-18	O	POS	O
			ISR 52/2018	CATTLE	20-Nov-18	O	POS	O
			ISR 53/2018	CATTLE	20-Nov-18	O	POS	O
			ISR 54/2018	CATTLE	20-Nov-18	O	POS	O
			ISR 55/2018	CATTLE	21-Nov-18	O	POS	O
			ISR 56/2018	CATTLE	21-Nov-18	NEG	POS	FMDV GD
			ISR 57/2018	CATTLE	21-Nov-18	O	POS	O
			ISR 58/2018	CATTLE	21-Nov-18	O	POS	O
			ISR 59/2018	WILD BOAR	23-Nov-18	O	POS	O
			ISR 60/2018	WILD BOAR	23-Nov-18	O	POS	O
			ISR 61/2018	WILD BOAR	23-Nov-18	NEG	POS	FMDV GD
			ISR 62/2018	WILD BOAR	23-Nov-18	O	POS	O
			ISR 63/2018	WILD BOAR	26-Nov-18	O	POS	O
			ISR 64/2018	WILD BOAR	26-Nov-18	O	POS	O
			ISR 65/2018	WILD BOAR	27-Nov-18	NEG	NEG	NVD
			ISR 66/2018	WILD BOAR	27-Nov-18	O	POS	O
			ISR 67/2018	CATTLE	29-Nov-18	O	POS	O
			ISR 68/2018	CATTLE	29-Nov-18	O	POS	O
			ISR 69/2018	CATTLE	29-Nov-18	O	POS	O
			ISR 70/2018	CATTLE	30-Nov-18	O	POS	O
			ISR 71/2018	CATTLE	30-Nov-18	O	POS	O
			ISR 72/2018	CATTLE	30-Nov-18	O	POS	O
			ISR 73/2018	CATTLE	03-Dec-18	O	POS	O
			ISR 74/2018	CATTLE	03-Dec-18	O	POS	O
			ISR 75/2018	CATTLE	03-Dec-18	O	POS	O
			ISR 76/2018	CATTLE	05-Dec-18	O	POS	O
			ISR 77/2018	CATTLE	05-Dec-18	O	POS	O
			ISR 78/2018	CATTLE	05-Dec-18	O	POS	O
			ISR 79/2018	CATTLE	12-Dec-18	O	POS	O
			ISR 80/2018	GAZELLE	12-Dec-18	O	POS	O
			ISR 81/2018	CATTLE	15-Dec-18	O	POS	O
			ISR 82/2018	GAZELLE	15-Dec-18	O	POS	O
			ISR 83/2018	CATTLE	24-Dec-18	O	POS	O
			ISR 84/2018	CATTLE	24-Dec-18	O	POS	O
			ISR 85/2018	CATTLE	24-Dec-18	O	POS	O
			ISR 86/2018	CATTLE	25-Dec-18	O	POS	O
			ISR 87/2018	CATTLE	25-Dec-18	O	POS	O

The content of this report is the property of WRLFMD®, The Pirbright Institute.

Copies of all the individual reports cited herein can be obtained from The Pirbright Institute and prior to presentation, publication or any other public use of these data, please contact Dr Donald King, The Pirbright Institute, donald.king@pirbright.ac.uk



Country	Date		WRL for FMD Sample Identification	Animal	Date of Collection	Results		
	Received	Reported				V/ELISA	RT-PCR	Final report
			ISR 88/2018	CATTLE	25-Dec-18	O	POS	O
Mongolia	21-Jan-2019	15-Feb-2019	MOG 16/2017	CATTLE	03-Feb-17	O	POS	O
			MOG 21/2018	CATTLE	02-Jan-18	O	POS	O
			MOG 22/2018	CATTLE	21-Feb-18	O	POS	O
			MOG 23/2018	CATTLE	21-Feb-18	O	POS	O
			MOG 24/2018	PIG	26-Feb-18	O	POS	O
			MOG 25/2018	CATTLE	26-Feb-18	O	POS	O
			MOG 26/2018	GAZELLE	03-Apr-18	NEG	NEG	NVD
Palestine , State of	15-Jan- 2019	04-Feb- 2019	PAT 1/2018	SHEEP	29-Jul-18	O	POS	O
Saudi Arabia	28-Feb-2019	18-Mar-2019	SAU 1/2018	ORYX	14-Jan-18	O	POS	O
			SAU 2/2018	GAZELLE	23-Jan-18	O	POS	O
			SAU 3/2018	CATTLE	31-Jan-18	NEG	NEG	NVD
			SAU 4/2018	CATTLE	31-Jan-18	NEG	POS	FMDV GD
			SAU 5/2018	CATTLE	31-Jan-18	NEG	NEG	NVD
			SAU 6/2018	CATTLE	31-Jan-18	NEG	NEG	NVD
			SAU 7/2018	CATTLE	31-Jan-18	NEG	POS	FMDV GD
			SAU 8/2018	SHEEP	27-Feb-18	O	POS	O
			SAU 9/2018	CATTLE	01-Dec-18	O	POS	O
			SAU 10/2018	CATTLE	01-Dec-18	O	POS	O
			SAU 11/2018	CATTLE	01-Dec-18	O	POS	O
South Korea	01-Feb- 2019	12-Feb- 2019	SKR 1/2019	CATTLE	28-Jan-19	O	POS	O
			SKR 2/2019	CATTLE	28-Jan-19	O	POS	O
			SKR 3/2019	CATTLE	28-Jan-19	O	POS	O
			SKR 4/2019	CATTLE	28-Jan-19	O	POS	O
			SKR 5/2019	CATTLE	28-Jan-19	O	POS	O
Uganda	12-Feb-2019	08-Mar-2019	UGA 1/2019	BOVINE	31-Jan-19	NEG	NEG	NVD
			UGA 2/2019	BOVINE	31-Jan-19	NEG	NEG	NVD
			UGA 3/2019	BOVINE	31-Jan-19	NEG	NEG	NVD
			UGA 4/2019	BOVINE	31-Jan-19	NEG	NEG	NVD
			UGA 5/2019	BOVINE	31-Jan-19	NEG	NEG	NVD
			UGA 6/2019	BOVINE	31-Jan-19	O	NEG	O
			UGA 7/2019	BOVINE	31-Jan-19	NEG	NEG	NVD
			UGA 8/2019	BOVINE	31-Jan-19	NEG	NEG	NVD
			UGA 9/2019	BOVINE	31-Jan-19	NEG	NEG	NVD
			UGA 10/2019	BOVINE	31-Jan-19	O	NEG	O
			UGA 11/2019	BOVINE	31-Jan-19	NEG	NEG	NVD
			UGA 12/2019	BOVINE	31-Jan-19	NEG	NEG	NVD
			UGA 13/2019	BOVINE	31-Jan-19	O	NEG	O
			UGA 14/2019	BOVINE	31-Jan-19	O	NEG	O
			UGA 15/2019	BOVINE	31-Jan-19	NEG	NEG	NVD
			UGA 16/2019	BOVINE	31-Jan-19	O	NEG	O
			UGA 17/2019	BOVINE	31-Jan-19	NEG	NEG	NVD
			UGA 18/2019	BOVINE	31-Jan-19	NEG	NEG	NVD
			UGA 19/2019	BOVINE	31-Jan-19	O	NEG	O
			UGA 20/2019	BOVINE	31-Jan-19	NEG	NEG	NVD

The content of this report is the property of WRLFMD®, The Pirbright Institute.

Copies of all the individual reports cited herein can be obtained from The Pirbright Institute and prior to presentation, publication or any other public use of these data, please contact Dr Donald King, The Pirbright Institute, donald.king@pirbright.ac.uk



Country	Date		WRL for FMD Sample Identification	Animal	Date of Collection	Results		
	Received	Reported				VI/ELISA	RT-PCR	Final report
			UGA 21/2019	BOVINE	31-Jan-19	O	NEG	O
			UGA 22/2019	BOVINE	31-Jan-19	NEG	NEG	NVD
			UGA 23/2019	BOVINE	31-Jan-19	NEG	NEG	NVD
			UGA 24/2019	BOVINE	31-Jan-19	NEG	NEG	NVD
			UGA 25/2019	BOVINE	31-Jan-19	NEG	NEG	NVD
			UGA 26/2019	BOVINE	31-Jan-19	NEG	NEG	NVD
			UGA 27/2019	BOVINE	31-Jan-19	O	NEG	O
			UGA 28/2019	BOVINE	02-Feb-19	A	POS	A
			UGA 29/2019	BOVINE	02-Feb-19	NEG	NEG	NVD
			UGA 30/2019	BOVINE	02-Feb-19	NEG	NEG	NVD
			UGA 31/2019	BOVINE	02-Feb-19	NEG	NEG	NVD
			UGA 32/2019	BOVINE	02-Feb-19	NEG	NEG	NVD
			UGA 33/2019	BOVINE	02-Feb-19	NEG	NEG	NVD
			UGA 34/2019	BOVINE	02-Feb-19	A	POS	A
			UGA 35/2019	BOVINE	02-Feb-19	A	POS	A
			UGA 36/2019	BOVINE	02-Feb-19	NEG	POS	FMDV GD
			UGA 37/2019	BOVINE	02-Feb-19	NEG	NEG	NVD
			UGA 38/2019	BOVINE	02-Feb-19	NEG	POS	FMDV GD
			UGA 39/2019	BOVINE	02-Feb-19	NEG	NEG	NVD
			UGA 40/2019	BOVINE	02-Feb-19	NEG	POS	FMDV GD
			UGA 41/2019	BOVINE	02-Feb-19	NEG	NEG	NVD
			UGA 42/2019	BOVINE	02-Feb-19	A	POS	A
			UGA 43/2019	BOVINE	07-Feb-19	NEG	NEG	NVD
			UGA 44/2019	BOVINE	07-Feb-19	NEG	NEG	NVD
			UGA 45/2019	BOVINE	07-Feb-19	NEG	NEG	NVD
			UGA 46/2019	BOVINE	07-Feb-19	NEG	NEG	NVD
			UGA 47/2019	BOVINE	07-Feb-19	NEG	NEG	NVD
			UGA 48/2019	BOVINE	07-Feb-19	NEG	NEG	NVD
			UGA 49/2019	BOVINE	07-Feb-19	NEG	NEG	NVD
			UGA 50/2019	BOVINE	07-Feb-19	NEG	NEG	NVD
			UGA 51/2019	BOVINE	07-Feb-19	NEG	NEG	NVD
			UGA 52/2019	BOVINE	07-Feb-19	NEG	NEG	NVD
Vietnam	05-Feb-2019	18-Mar-2019	VIT 3/2018	CATTLE	23-Jan-18	O	POS	O
			VIT 4/2018	PIG	30-Jan-18	NEG	POS	FMDV GD
			VIT 5/2018	PIG	03-Feb-18	O	POS	O
			VIT 6/2018	PIG	07-Feb-18	O	POS	O
			VIT 7/2018	CATTLE	09-Mar-18	O	POS	O
			VIT 8/2018	PIG	11-Mar-18	O	POS	O
			VIT 9/2018	PIG	13-Mar-18	O	POS	O
			VIT 10/2018	PIG	14-Mar-18	O	POS	O
			VIT 11/2018	CATTLE	13-Apr-18	O	POS	O
			VIT 12/2018	CATTLE	28-Apr-18	O	POS	O
			VIT 13/2018	BUFFALO	29-May-18	O	POS	O
			VIT 14/2018	CATTLE	22-Jun-18	O	POS	O
			VIT 15/2018	BUFFALO	26-Jul-18	NEG	NEG	NVD
			VIT 16/2018	BUFFALO	05-Sep-18	NEG	NEG	NVD
			VIT 17/2018	PIG	19-Sep-18	O	POS	O
			VIT 18/2018	GOAT	27-Sep-18	O	POS	O
			VIT 19/2018	PIG	14-Oct-18	O	POS	O
VIT 20/2018	CATTLE	17-Oct-18	O	POS	O			

The content of this report is the property of WRLFMD®, The Pirbright Institute.

Copies of all the individual reports cited herein can be obtained from The Pirbright Institute and prior to presentation, publication or any other public use of these data, please contact Dr Donald King, The Pirbright Institute, donald.king@pirbright.ac.uk



Country	Date		WRL for FMD Sample Identification	Animal	Date of Collection	Results		
	Received	Reported				VI/ELISA	RT-PCR	Final report
			VIT 21/2018	PIG	22-Oct-18	O	POS	O
			VIT 22/2018	BUFFALO	11-Nov-18	O	POS	O
			VIT 23/2018	PIG	13-Nov-18	O	POS	O
			VIT 24/2018	PIG	13-Nov-18	O	POS	O
			VIT 25/2018	PIG	14-Nov-18	O	POS	O
			VIT 26/2018	PIG	20-Nov-18	O	POS	O
			VIT 27/2018	PIG	29-Nov-18	O	POS	O
			VIT 28/2018	PIG	01-Dec-18	O	POS	O
			VIT 29/2018	PIG	17-Dec-18	O	POS	O
			VIT 30/2018	PIG	19-Dec-18	O	POS	O
			VIT 31/2018	PIG	20-Dec-18	O	POS	O
			VIT 32/2018	PIG	21-Dec-18	O	POS	O
			VIT 33/2018	PIG	21-Dec-18	O	POS	O
			VIT 34/2018	PIG	22-Dec-18	O	POS	O
			VIT 35/2018	CATTLE	24-Dec-18	O	POS	O
			VIT 36/2018	PIG	26-Dec-18	O	POS	O
			VIT 37/2018	PIG	27-Dec-18	O	POS	O
			VIT 38/2018	PIG	27-Dec-18	O	POS	O
			VIT 39/2018	PIG	27-Dec-18	O	POS	O
			VIT 40/2018	PIG	27-Dec-18	O	POS	O
			VIT 41/2018	PIG	29-Dec-18	O	POS	O
			VIT 42/2018	PIG	29-Dec-18	NEG	NEG	NVD
			VIT 43/2018	PIG	30-Dec-18	O	POS	O
			VIT 44/2018	PIG	30-Dec-18	O	POS	O
			VIT 45/2018	PIG	30-Dec-18	O	POS	O
			VIT 46/2018	PIG	31-Dec-18	O	POS	O
			VIT 1/2019	PIG	01-Jan-19	O	POS	O
			VIT 2/2019	PIG	03-Jan-19	NEG	POS	FMDV GD
			VIT 3/2019	PIG	04-Jan-19	O	POS	O
			VIT 4/2019	PIG	05-Jan-19	O	POS	O
			VIT 5/2019	PIG	07-Jan-19	NEG	POS	FMDV GD
			VIT 6/2019	PIG	08-Jan-19	O	POS	O
			VIT 7/2019	PIG	08-Jan-19	NEG	POS	FMDV GD
			VIT 8/2019	PIG	08-Jan-19	NEG	POS	FMDV GD
			VIT 9/2019	PIG	11-Jan-19	O	POS	O
			VIT 10/2019	PIG	14-Jan-19	O	POS	O
			VIT 11/2019	PIG	15-Jan-19	O	POS	O
			TOTAL	319				

Abbreviations used in table

FMD(V)	Foot-and-mouth disease (virus)
FMDV GD	Genome detected
FMDV NGD	Genome not detected (samples submitted in Trizol, only rRT-PCR carried out)

The content of this report is the property of WRLFMD®, The Pirbright Institute.

Copies of all the individual reports cited herein can be obtained from The Pirbright Institute and prior to presentation, publication or any other public use of these data, please contact Dr Donald King, The Pirbright Institute, donald.king@pirbright.ac.uk



VI/ELISA	FMDV serotype identified following virus isolation in cell culture and antigen ELISA
rRT-PCR	Real-time reverse transcription polymerase chain reaction on epithelial suspension for FMD (or SVD) viral genome
NVD	No foot-and-mouth disease, swine vesicular disease or vesicular stomatitis virus detected
NT	Not tested

The content of this report is the property of WRLFMD®, The Pirbright Institute.

Copies of all the individual reports cited herein can be obtained from The Pirbright Institute and prior to presentation, publication or any other public use of these data, please contact Dr Donald King, The Pirbright Institute, donald.king@pirbright.ac.uk



2.6. Antigenic Characterisation

Antigenic characterisation of FMD field isolates by matching with vaccine strains by 2dmVNT from January to March 2019.

Table 6: Vaccine matching studies for O FMDV by VNT

Strain	Serotype	Topotype	Lineage	O 3039	O1 Manisa	O/TUR/5/2009	O 5911	O SKR 7/10
ALG/1/2019	O	EA-3	-	0.50	0.33	0.52	NT	NT
ALG/5/2018	O	EA-3	-	0.85	0.51	0.62	NT	NT
BKF/4/2018	O	EA-3	-	1	0.87	0.93	NT	NT
BKF/9/2018	O	EA-3	-	0.74	0.66	0.68	NT	NT
HKN/21/2018	O	CATHAY	-	0.19	0.09	0.13	NT	NT
HKN/23/2018	O	CATHAY	-	0.20	0.11	0.09	NT	NT
ISR/2/2018	O	ME-SA	PanAsia-2	0.32	0.30	0.48	0.41	NT
ISR/4/2018	O	ME-SA	PanAsia-2	0.18	0.24	0.50	0.36	NT
ISR/42/2018	O	ME-SA	PanAsia-2	0.44	0.39	0.46	NT	NT
ISR/71/2018	O	ME-SA	PanAsia-2	0.72	0.60	0.69	NT	NT
ISR/78/2018	O	ME-SA	PanAsia-2	0.65	0.65	0.69	NT	NT
LAO/1/2018	O	ME-SA	PanAsia	0.79	0.93	0.69	NT	NT
MOG/21/2018	O	ME-SA	Ind-2001	0.43	0.45	0.56	NT	NT
MOG/23/2018	O	ME-SA	Ind-2001	0.46	0.40	0.76	NT	NT
MOG/25/2018	O	SEA	Mya-98	0.62	0.22	0.47	NT	NT
PAT/1/2018	O	EA-3	-	0.65	0.46	0.56	NT	NT
SEL/13/2018	O	EA-3	-	0.79	0.58	0.28	NT	NT
SKR/1/2019	O	ME-SA	Ind-2001	0.62	0.45	0.85	NT	0.69
SKR/4/2019	O	ME-SA	Ind-2001	0.74	0.52	0.78	NT	0.74
SSD/6/2017	O	EA-3	-	0.81	0.93	0.72	NT	NT
TAI/13/2017	O	ME-SA	Ind-2001	0.43	0.35	0.51	NT	NT
TAI/16/2017	O	ME-SA	Ind-2001	0.31	0.28	0.28	NT	NT
TAI/4/2018	O	ME-SA	PanAsia	0.51	0.45	0.38	NT	NT

The content of this report is the property of WRLFMD®, The Pirbright Institute.

Copies of all the individual reports cited herein can be obtained from The Pirbright Institute and prior to presentation, publication or any other public use of these data, please contact Dr Donald King, The Pirbright Institute, donald.king@pirbright.ac.uk



Table 7: Vaccine matching studies for A FMDV by VNT

Strain	Serotype	Topotype	Lineage	A/IRN/05	A/TUR/20/06	A22 IRAQ	A/ERI/3/98	A MAY 97
TAI/10/2017	A	ASIA	Sea-97	0.09	0	0.41	NT	0.34
TAI/19/2017	A	ASIA	Sea-97	0.07	0	0.46	NT	0.28
ZAM/4/2018	A	AFRICA	G-I	0.45	0	0.43	0.17	NT
ZAM/5/2018	A	AFRICA	G-I	0.50	0	0.50	0.19	NT

Abbreviations used in tables

M	<p>Vaccine Match</p> <p>$r_1 = \geq 0.3$. Suggests that there is a close relationship between field isolate and vaccine strain. A potent vaccine containing the vaccine strain is likely to confer protection.</p>
N	<p>No Vaccine Match</p> <p>$r_1 = < 0.3$. Suggests that the field isolate is so different from the vaccine strain that the vaccine is unlikely to protect</p>
B	<p>Borderline</p> <p>Any r_1 values between 0.28 to 0.32</p>
NT	<p>Not tested against this vaccine</p>

The content of this report is the property of WRLFMD®, The Pirbright Institute.

Copies of all the individual reports cited herein can be obtained from The Pirbright Institute and prior to presentation, publication or any other public use of these data, please contact Dr Donald King, The Pirbright Institute, donald.king@pirbright.ac.uk



Annex 2: FMD publications

Recent FMD Publications (January to March 2019) cited by Web of Science (Pirbright Institute papers and authors are highlighted in **BOLD AND GREY**)

1. Alam, A., M.R. Ali, and M.A. Hossain (2019). Letter to the editor about the classification of recently emerged *Foot-and-mouth disease virus* O/ME-SA/Ind2001 sublineages concerning two published articles in *Transboundary and Emerging Diseases*. *Transboundary and Emerging Diseases*, **66**(2): 1093-1094.
2. Arzt, J., M.A. Branan, A.H. Delgado, S. Yadav, K.I. Moreno-Torres, M.J. Tildesley, and C. Stenfeldt (2019). Quantitative impacts of incubation phase transmission of *Foot-and-mouth disease virus*. *Scientific Reports*, **9**: 13.
3. **Bachanek-Bankowska, K., J. Wadsworth, E. Henry, A.B. Ludi, A. Bin-Tarif, B. Statham, D.P. King**, M. Afzal, M. Hussain, S. Manzoor, M. Abubakar, and **N.J. Knowles** (2019). Genome sequences of antigenically distinct serotype O foot-and-mouth disease viruses from Pakistan. *Microbiology Resource Announcements*, **8**(3): 2.
4. Bo, L.L., K.S. Lwin, S. Ungvanijban, **N.J. Knowles, J. Wadsworth, D.P. King**, R. Abila, and Y. Qiu (2019). Foot-and-mouth disease outbreaks due to an exotic serotype Asia 1 virus in Myanmar in 2017. *Transboundary and Emerging Diseases*, **66**(2): 1067-1072.
5. Chang, J.T., Y. Zhang, D.C. Yang, Z.G. Jiang, F. Wang, and L. Yu (2019). Potent neutralization activity against type O *Foot-and-Mouth Disease Virus* elicited by a conserved type O neutralizing epitope displayed on bovine parvovirus virus-like particles. *Journal of General Virology*, **100**(2): 187-198.
6. Dash, L., S. Subramaniam, S.A. Khulape, B.R. Prusty, K. Pargai, S.D. Narnaware, N.V. Patil, and B. Pattnaik (2019). Development and utilization of VHH antibodies derived from *Camelus Dromedarius* against *Foot-and-Mouth Disease Virus*. *Animal Biotechnology*, **30**(1): 57-62.
7. Diab, E., A.H.I. Bazid, M. Fawzy, W.R. El-Ashmawy, A.A. Fayed, and M.M. El-Sayed (2019). Foot-and-mouth disease outbreaks in Egypt during 2013-2014: Molecular characterization of serotypes A, O, and SAT2. *Veterinary World*, **12**(2): 190-197.
8. Doosti, M., M. Nassiri, K. Nasiri, M. Tahmoorespur, and S. Zibae (2019). Effect of IL-2 co-expressed or co-inoculated with immuno-dominant epitopes from VP1 protein of FMD virus on immune responses in BALB/c mice. *Iranian Journal of Basic Medical Sciences*, **22**(3): 302-309.
9. Du, P., P. Sun, S.Q. Sun, J.J. Dong, H. Dong, R.H. Liu, H.C. Guo, K.B. Mu, and Z.X. Liu (2019). Separation and purification of *Foot-and-mouth disease virus* by multiple-stage aqueous two-phase extraction system. *Process Biochemistry*, **77**: 143-150.

The content of this report is the property of WRLFMD®, The Pirbright Institute.

Copies of all the individual reports cited herein can be obtained from The Pirbright Institute and prior to presentation, publication or any other public use of these data, please contact Dr Donald King, The Pirbright Institute, donald.king@pirbright.ac.uk



10. Fernandez-Chamorro, J., R. Francisco-Velilla, J. Ramajo, and E. Martinez-Salas (2019). Rab1b and ARF5 are novel RNA-binding proteins involved in FMDV IRES-driven RNA localization. *Life Science Alliance*, **2**(1): 14.
11. Firestone, S.M., Y. Hayama, R. Bradhurst, T. Yamamoto, T. Tsutsui, and M.A. Stevenson (2019). Reconstructing foot-and-mouth disease outbreaks: a methods comparison of transmission network models. *Scientific Reports*, **9**: 12.
12. Gladue, D.P., V. O'Donnell, R. Baker-Branstetter, L.G. Holinka, J.M. Pacheco, I.F. Sainz, Z. Lu, X. Ambroggio, L. Rodriguez, and M.V. Borca (2019). *Foot-and-mouth disease virus* modulates cellular vimentin for virus survival (vol 87, pg 6794, 2013). *Journal of Virology*, **93**(2): 1.
13. Hemida, M.G., W.R. El-Ghareeb, F. Al-Hizab, and A. Ibrahim (2019). *Foot-and-mouth disease virus* O/ME-SA/Ind 2001 lineage outbreak in vaccinated Holstein Friesian cattle in Saudi Arabia in 2016. *Veterinary Quarterly*, **38**(1): 88-98.
14. Kim, M.K. and H.A. Tejada (2018). Implicit Cost of the 2010 Foot-and-Mouth Disease in Korea. *Studies in Agricultural Economics*, **120**(3): 166-173.
15. Kim, T., J.K. Hong, J.K. Oem, K.N. Lee, H.S. Lee, Y.J. Kim, S. Ryoo, Y.J. Ko, J.H. Park, J. Choi, S.H. Lee, H.J. Jo, M.H. Lee, B. Kim, and J. Kim (2019). Cross-protective efficacy of the O1 Manisa + O 3039 bivalent vaccine and the O 3039 monovalent vaccine against heterologous challenge with FMDV O/Jincheon/SKR/2014 in pig. *Vaccine*, **37**(12): 1702-1709.
16. Ko, M.K., H.E. Jo, J.H. Choi, S.H. You, S.H. Shin, H. Jo, M.J. Lee, S.M. Kim, B. Kim, and J.H. Park (2019). Chimeric vaccine strain of type O foot-and-mouth disease elicits a strong immune response in pigs against ME-SA and SEA topotypes. *Veterinary Microbiology*, **229**: 124-129.
17. Kristensen, T. and G.J. Belsham (2019). Identification of a short, highly conserved, motif required for *picornavirus* capsid precursor processing at distal sites. *Plos Pathogens*, **15**(1): 22.
18. Lee, H., J. Nah, S. Ryoo, T. Kim, S. Lee, S. Jung, J. Lee, H.J. Park, B.S. Ha, J.W. Lee, T.D. Nguyen, L.T. To, S.H. Wee, and B.K. Ku (2019). Complete Genome Sequence of O/VN1/2014, a *Foot-and-Mouth Disease Virus* of Serotype O Isolated in Vietnam in 2014. *Microbiology Resource Announcements*, **8**(6): 2.
19. Lee, K.W., K.N. Lee, H.S. Lillehoj, and J.H. Park (2019). Serum concentration of acute phase proteins and cytokines in vaccinated pigs challenged with *Foot-and-mouth disease virus* serotype O. *Revista Brasileira De Zootecnia*, **48**: 7.
20. Li, S.F., M.J. Gong, Y.L. Xie, J.J. Shao, F.R. Zhao, Y.G. Zhang, and H.Y. Chang (2019). A novel type I interferon, interferon $\alpha\omega$, shows antiviral activity against *Foot-and-mouth disease virus* *in vitro*. *Microbial Pathogenesis*, **127**: 79-84.
21. Lung, O., M. Fisher, A. Erickson, C. Nfon, and A. Ambagala (2019). Fully automated and integrated multiplex detection of high consequence livestock viral genomes on a microfluidic platform. *Transboundary and Emerging Diseases*, **66**(1): 144-155.

The content of this report is the property of WRLFMD®, The Pirbright Institute.

Copies of all the individual reports cited herein can be obtained from The Pirbright Institute and prior to presentation, publication or any other public use of these data, please contact Dr Donald King, The Pirbright Institute, donald.king@pirbright.ac.uk



22. **Lyons, N.A.**, T.J.D. Knight-Jones, C. Bartels, **D.J. Paton**, G. Ferrari, M.S. Vermillion, A.W. Brooks, R. Motroni, E. Parker, M.L.H. Berquist, K.J. Sumption, and E. Klement (2019). Considerations for design and implementation of vaccine field trials for novel foot-and-mouth disease vaccines. *Vaccine*, **37**(8): 1007-1015.
23. Mahdy, S.E., S.J. Liu, L. Su, X. Zhang, H.T. Chen, X.F. Pei, and C. Wang (2019). Expression of the VP1 protein of FMDV integrated chromosomally with mutant *Listeria monocytogenes* strain induced both humoral and cellular immune responses. *Applied Microbiology and Biotechnology*, **103**(4): 1919-1929.
24. Martel, E., E. Forzono, R. Kurker, B.A. Clark, J.G. Neilan, and M. Puckette (2019). Effect of *Foot-and-mouth disease virus* 3C protease B-2 beta-strand proline mutagenesis on expression and processing of the P1 polypeptide using a plasmid expression vector. *Journal of General Virology*, **100**(3): 446-456.
25. Masole, C., O.I. Ayuya, and J.C. Moreki (2019). Determinants of adoption of alternative response to foot-and-mouth disease: micro-level evidence of smallholder pastoralist in north East District, Botswana. *Tropical Animal Health and Production*, **51**(2): 373-382.
26. Maung, W.Y., T. Nishi, T. Kato, K.O. Lwin, and K. Fukai (2019). Genome Sequences of Foot-and-Mouth Disease Viruses of Serotype O Lineages Mya-98 and Ind-2001d Isolated from Cattle and Buffalo in Myanmar. *Microbiology Resource Announcements*, **8**(8): 2.
27. Mignaqui, A.C., V. Ruiz, Y. Durocher, and A. Wigdorovitz (2019). Advances in novel vaccines for foot and mouth disease: focus on recombinant empty capsids. *Critical Reviews in Biotechnology*, **39**(3): 306-320.
28. Miller, M., L.R. Liu, S. Shwiff, and S. Shwiff (2019). Macroeconomic impact of foot-and-mouth disease vaccination strategies for an outbreak in the Midwestern United States: A computable general equilibrium. *Transboundary and Emerging Diseases*, **66**(1): 156-165.
29. Nikvand, A.A., S.M. Jalali, M. Nouri, A. Ghadrddan Mashhadi, and S. Hassanpour Amirabadi (2019). Electrocardiogram and serum cardiac biomarkers changes in FMD in cattle. *Turkish Journal of Veterinary & Animal Sciences*, **43**(2): 285-291.
30. Ouagal, M., E. Brocchi, S. Grazioli, B.Y. Adel, S. Keith, D. Kiram, A. Oussiguere, P. Hendriks, D. Berkvens, and C. Saegerman (2018). Study on seroprevalence and serotyping of foot-and-mouth disease in Chad. *Revue Scientifique Et Technique-Office International Des Epizooties*, **37**(3): 937-947.
31. Palinski, R.M., M.R. Bertram, L.T. Vu, S.J. Pauszek, E.J. Hartwig, G.R. Smoliga, C. Stenfeldt, I.H. Fish, B.H. Hoang, N.T. Phuong, V.V. Hung, P.P. Vu, N.K. Dung, P.V. Dong, N.N. Tien, N.D. Tho, D.H. Dung, and J. Arzt (2019). First genome sequence of *Foot-and-mouth disease virus* serotype O sublineage Ind2001e from southern Vietnam. *Microbiology Resource Announcements*, **8**(10): 2.
32. Pezzoni, G., A. Bregoli, S. Grazioli, I. Barbieri, H. Madani, A. Omani, H. Sadaoui, N. Bouayed, **J. Wadsworth**, **K. Bachanek-Bankowska**, **N.J. Knowles**, **D.P. King**, and E. Brocchi (2019). Foot-and-mouth disease outbreaks due to an exotic

The content of this report is the property of WRLFMD®, The Pirbright Institute.

Copies of all the individual reports cited herein can be obtained from The Pirbright Institute and prior to presentation, publication or any other public use of these data, please contact Dr Donald King, The Pirbright Institute, donald.king@pirbright.ac.uk



- virus serotype A lineage (A/AFRICA/G-IV) in Algeria in 2017. *Transboundary and Emerging Diseases*, **66**(1): 7-13.
33. Pfaff, F., S. Hagglund, M. Zoli, S. Blaise-Boisseau, E. Laloy, S. Koethe, D. Zuhlke, K. Riedel, S. Zientara, L. Bakkali-Kassimi, J.F. Valarcher, D. Hoper, M. Beer, and M. Eschbaumer (2019). Proteogenomics Uncovers Critical Elements of Host Response in Bovine Soft Palate Epithelial Cells Following *In Vitro* Infection with *Foot-and-mouth disease virus*. *Viruses-Basel*, **11**(1): 19.
 34. Raza, S., K. Siddique, M. Rabbani, T. Yaqub, A.A. Anjum, M. Ibrahim, M. Azhar, F. Jamil, and M.A. Rasheed (2019). *In silico* analysis of four structural proteins of *aphthovirus* serotypes revealed significant B and T cell epitopes. *Microbial Pathogenesis*, **128**: 254-262.
 35. Sanchez-Vazquez, M.J., L.P. Buzanovsky, A.G. dos Santos, R.M. Allende, O. Cosivi, and A.M. Rivera (2019). Investigating the temporal and spatial distribution of *Foot-and-mouth disease virus* serotype C in the Region of South America, 1968-2016. *Transboundary and Emerging Diseases*, **66**(2): 653-661.
 36. Turner, J., A.E. Jones, A.E. Heath, M. Wardeh, C. Caminade, G. Kluiters, R.G. Bowers, A.P. Morse, and M. Baylis (2019). The effect of temperature, farm density and foot-and-mouth disease restrictions on the 2007 UK bluetongue outbreak. *Scientific Reports*, **9**: 10.
 37. Visser, L.J., G.N. Medina, H.H. Rabouw, R.J. de Groot, M.A. Langereis, T. de los Santos, and F.J.M. van Kuppeveld (2019). *Foot-and-mouth disease virus* leader protease cleaves G3BP1 and G3BP2 and inhibits stress granule formation. *Journal of Virology*, **93**(2): 16.
 38. Xie, Y.L., H.T. Li, X.C. Qi, Y.J. Ma, B. Yang, S.M. Zhang, H.Y. Chang, X.P. Yin, and Z.Y. Li (2019). Immunogenicity and protective efficacy of a novel *Foot-and-mouth disease virus* empty-capsid-like particle with improved acid stability. *Vaccine*, **37**(14): 2016-2025.
 39. Zhao, R., X.Y. Meng, G.Y. Jia, Y.Z. Yu, and B.C. Song (2019). Oral pre-administration of Purslane polysaccharides enhance immune responses to inactivated foot-and-mouth disease vaccine in mice. *BMC Veterinary Research*, **15**: 12.
 40. Zhu, Z.X., J.J. He, F. Yang, H.X. Zheng, and X.T. Liu (2019). Response to comment on "First detection of *Foot-and-mouth disease virus* O/ME-SA/Ind2001 in China". *Transboundary and Emerging Diseases*, **66**(2): 1095-1096.
 41. Zou, X.Q., Y.Y. Zhu, H.F. Bao, X.Y. Guo, P. Sun, Z.X. Liu, P.W. Mason, L. Xu, C. Li, Q.Y. Zhang, Q. Wang, H.F. Zhu, and Q.Z. Zhao (2019). Recombination of host cell mRNA with the Asia 1 *Foot-and-mouth disease virus* genome in cell suspension culture. *Archives of Virology*, **164**(1): 41-50.

The content of this report is the property of WRLFMD®, The Pirbright Institute.

Copies of all the individual reports cited herein can be obtained from The Pirbright Institute and prior to presentation, publication or any other public use of these data, please contact Dr Donald King, The Pirbright Institute, donald.king@pirbright.ac.uk



Annex 4: Brief round-up of WRLFMD activities

Proficiency test scheme organised by WRLFMD:

Phase XXXI: Feedback letters are being drafted for those laboratories that participated in this phase of the proficiency test scheme.

Phase XXXII: Sample panels (including “live” and inactivated samples for virology assays, and validated sera for FMDV-specific antibody tests) are being prepared at the WRLFMD. Please contact WRLFMD if you would like more information about participating in this phase of the proficiency test scheme.

Residential Training Course:

The course organised for May 2019 is now full. Information about the residential course that will run in 2020 will be posted on the website below; <https://www.pirbright.ac.uk/training-courses/diagnosis-foot-and-mouth-disease>

E-learning training:

During February-March 2019, over 100 scientists from FMD Reference Laboratories and international research institutions participated in the latest round of e-learning training in FMD diagnostic methods (provided in partnership with EuFMD: <https://eufmdlearning.works/>).

Training missions:

- WRLFMD organised a training course for diagnostic scientists in East Africa in Sebeta, Ethiopia covering FMD test methods (funded under OIE Twinning Project with NAHDIC, Ethiopia)
- Contributed to a training course for West African Scientists organised by the FAO in the Ivory Coast on 25th -28th February 2019

Summary of Meetings attended by WRLFMD Scientists

- EuFMD ExCom meeting in Rome on 31st January 2019 (<http://www.fao.org/eufmd/meetings-and-events/detail/en/c/1187262/>)
- Scientific Committee on Animal Diseases (SCAD) held at OIE Paris on 19th February 2019
- OIE/FAO FMD Roadmap meeting in Shiraz, Iran during 4th-6th March 2019 (<http://www.fao.org/eufmd/meetings-and-events/detail/en/c/1176883/>)

The content of this report is the property of WRLFMD®, The Pirbright Institute.

Copies of all the individual reports cited herein can be obtained from The Pirbright Institute and prior to presentation, publication or any other public use of these data, please contact Dr Donald King, The Pirbright Institute, donald.king@pirbright.ac.uk